A STUDY TO ASSESS THE EFFECTIVENESS OF INDIVIDUALIZED NUTRITIONAL EDUCATION AMONG PATIENTS UNDERGOING HEMODIALYSIS IN GKNM HOSPITAL, COIMBATORE

Reg. No: 301212308

A DISSERTATION SUBMITTED TO THE TAMIL NADU Dr. M. G. R. MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILLMENT OF REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN NURSING

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CERTIFICATE

This is to certify that the dissertation entitled **A STUDY TO ASSESS THE EFFECTIVENESS OF INDIVIDUALIZED NUTRITIONAL EDUCATION AMONG PATIENTS UNDERGOING HEMODIALYSIS IN GKNM HOSPITAL, COIMBATORE** is submitted to the Faculty of Nursing, The Tamil Nadu Dr. M. G. R Medical University, Chennai. It is the bonafide work done by Reg**.** No: **301212308** in partial fulfillment of the requirement for the award of the degree of Master of Science in Nursing, Branch-I Medical Surgical Nursing, Sub Specialty-Cardiovascular and Thoracic Nursing during the academic year 2013-14.

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"You don't need to know where you are going if you know GOD is leading"

Heb.11: 8-10

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ABSTRACT

A pre-experimental study was conducted to "Assess the Effectiveness of Individualized Nutritional Education among Patients Undergoing Hemodialysis in GKNM Hospital, Coimbatore"**. Objectives: 1**. To assess the nutritional status of patients undergoing hemodialysis. **2.** To compare the pretest and post test knowledge scores regarding nutrition among patients undergoing hemodialysis **3.**To find the association between pretest knowledge scores of nutrition with selected demographic variables of patients undergoing hemodialysis. **Conceptual framework:** Modified Imogene King - Transaction Process Model was used for the study. **Research design:** Pre-experimental one group pretest posttest design was the research design used for the study. **Setting:** The study was conducted in the dialysis unit of GKNM Hospital, Coimbatore. **Samples:** Twenty samples that fulfilled the criteria were selected. **Sampling techniques:** Convenient sampling technique was used to select the samples. **Methods:** During the first visit of data collection, patients were interviewed using the structured interview guide, assessed for their level of nutritional status using modified dialysis malnutrition score and level of knowledge on nutritional education using structured knowledge questionnaire. The individualized nutritional education was provided to patients undergoing hemodialysis during the second visit and the posttest was performed during the fourth visit. Study outcomes were calculated using descriptive and inferential statistics. **Results:** The study showed that 1) All patients 20(100%) were mild to moderately malnourished. 2) The mean pretest level of knowledge on nutrition among patients undergoing hemodialysis was 7.75 (SD= 8.26) and post test was 22.30 (SD= 21.76). The computed't' value (15.50) is higher than the table value (2.86) at 0.01 level of significance with 19 degrees of freedom. Thus the study concluded that there was a significant difference between the mean pre test and post test level of knowledge on nutrition among patients undergoing hemodialysis. 3**)** There was an association between the pretest knowledge scores on nutrition and education. **Conclusion**: Thus the study concluded that, individualized nutritional education is a cost effective method to improve the knowledge on nutrition, lowers the risk of complications and thus improve the quality of life among patient undergoing hemodialysis.

CHAPTER I

INTRODUCTION

"Protect your kidney; save your heart".

- World kidney day 2011.

"Bones can break, glands can loaf, muscles can atrophy, and even brain can go to rest without immediate danger to survival; but if kidneys fail: Neither bones, glands, muscle nor brain could carry on". **(Mantik, Sharon, Lewis., et al 2011)**

This statement emphasizes the importance of kidney in our life. Proper functioning of kidney was essential to maintain health, because it filters blood, and excretes waste products and maintains homeostasis of body. **(Mantik, Sharon, Lewis., et al 2011)**

Sedentary life style, lack of healthy activities, food habits and stress from daily living etc, were the contributing risk factors to develop life threatening conditions; one among them was chronic kidney disease, which involves progressive, irreversible loss of kidney function **(Smeltzer, C. S., et al 2010)**

Chronic kidney disease was a major health problem; In India an alarming number of about 80 lakhs people are suffering from this disease. Clients with chronic renal failure develop less kidney functioning at less than 10-15% of capacity. The kidneys are not able to keep up with waste and fluid clearance on their own and dialysis becomes the only option to support life. **(Harilall, Bharita., 2006)**

Dialysis is an artificial process used to purify the blood. Dialysis will not cure kidney disease but it removes the waste products and excess water from the body and stabilizes the blood chemistries. Hemodialysis removes waste products and excess fluid directly from the blood by pumping it through a filter called a dialyzer, or artificial kidney. A small amount of blood is continually removed from the body, pumped through the dialyzer filter and returned to the body. Only a small amount of blood was taken outside of the body at any time because it is a continuous process. The blood is returned to the body as fast it is removed. **(Kline, Bolton., et al. 2004)**

The management of End Stage Renal Disease requires significant life style adjustments. Patients with End Stage Renal Disease are required to follow a complicated treatment protocol that includes frequent hemodialysis sessions, severe dietary restrictions, a complex medication regimen, and an exercise prescription. Failure to follow this regimen may result in short & long term consequences for health and survival. In short term, non adherence to treatment regimens may increase the likelihood of emergency and hospital admissions. The development of additional co-morbidities, like cardio vascular disease, and mortality are potential long term consequences. Adherence to dietary restrictions is an important determinant of health outcomes for patients with End Stage Renal Disease, an increase risk of complication and death is associated with dietary non adherence. **(Khalil, A.A., et al 2010)**

Clients on long term hemodialysis having a high risk for complications. Malnutrition is common in patients with chronic renal failure (CRF). **(Jai, Prakash., et al 2007)**

Patients with end stage renal disease undergoing hemodialysis often experience malnutrition as a result of inadequate dialysis; decreased dietary intake; loss of nutrients into the dialysate; abnormal carbohydrate, lipid and protein metabolism; which contribute to an increase in mortality and morbidity. **(Priscilla, P., et al 2004)**

In hemodialysis, protein energy malnutrition and wasting were common among chronic kidney disease patients and was associated with higher rates of morbidity and mortality. Several studies shows cardiovascular disease and inflammation causes malnutrition among these patients **(Pragna, Rao., et al 2008)**

There are 2 types of malnutrition in dialysis patients. The first one is due to decreasing energy and protein intake and the second one is associated with inflammation and atherosclerosis. In addition, malnutrition due to poor nutrition, uremic bone disease, volume overload congestive heart failure, systemic hypertension, and extra skeletal metastatic calcification are other adverse conditions occurred as a result of the diet incompatibility**.**

The dialysis procedure itself results in losses of nutrients into dialysate and, independent of these losses of nutrients, appears to result in an increase in catabolism

during hemodialysis. The presence of metabolic acidosis, which was common in patients with end stage renal disease, may also be associated with increased catabolism in these patients. **(B. Barun , 2010)**

There were several factors in end stage renal disease patients that enhances protein catabolism and increases protein requirements, such as amino acid abnormality, low energy intake, physical inactivity, infection and inflammation, endocrine abnormality, cardiac failure, metabolic acidosis, and anemia.**(Bergstrom, J., 1998)**

Increased protein catabolism, hypoalbuminemia and dialysis nutrient loss are the factors which causes malnutrition in patients undergoing hemodialysis. In dialysis patients, a healthy balanced diet is very important. The choice of diet and taking prescribed medications plays an important role in well- being of dialysis patient. The right amounts of energy, carbohydrate, protein, vitamins, minerals and fluids has to be taken. **(Nutrition in dialysis patients, virtual medical centre, 2008)**

What we eat and drink can slow down chronic kidney disease. Some foods were better for our kidneys than others. Proper selection and preparation of food was essential. The knowledge on dietary regulations and fluid restrictions were important to maintain heath status in dialysis patients and this reduces the risk of mortality and morbidity. **(Narva, A. S., et al 2009)**

Hemodialysis patients has to give special attention to the nutrient content of foods which they consume to cope with excess fluid and metabolic waste. Patients on maintenance hemodialaysis were receiving inadequate nutrition and several studies shows that toxins that accumulate with renal failure suppress appetite and contribute to nutritional decline.

NEED FOR THE STUDY

What is man, but a minutely set, ingenious machine for turning, with infinite artfulness, the red wine of Shiraz into urine; so said the story teller in Isak Dinesen, seven gothic tales. (**Cotran, Kumar, Robins., 2008)**

Human kidneys convert more than 2000 liters of blood per day into about 1-1.5 liters of highly concentrated specialized fluid called urine. Kidney excretes the waste products of metabolism and maintains appropriate acid balance of plasma, regulates body's concentration of salt and water and serves as an endocrine organ. This physiological mechanism makes kidney a high degree of structural complexity. (**Cotran, Kumar, Robins. 2008)**

One of the major vital organs is the kidney. Proper functioning of the urinary system is essential. Current studies shows disorders of the kidney are the leading cause of death throughout the country. (**Smeltzer, C.S., et al 2010)**

Chronic renal failure was a progressive irreversible deterioration in renal function which renders the patient to depend up on hemodialysis. Through hemodialysis, the symptoms of early stage of renal impairment may be minimized and use of medication, control of fluid intake and regulation of diet are the other treatment. **(Smeltzer, C.S., et al 2010)**

Hemodialysis was considered as a life sustaining treatment for acute and chronic renal failure. The care of patients on maintenance hemodialysis include medications, fluid and diet therapy, care of catheter site etc. **(Smeltzer, C.S., et al 2010)**

The incidence of chronic renal failure was increased by 9% per year for the past 6 years. In United States, more than 2, 80,000 patients with chronic renal failure (68%) were receiving hemodialysis. In India there were almost 1.6 lakhs new cases with end stage renal disease, which require dialysis and transplantations. Chronic kidney disease was a public health problem worldwide, a social calamity and an economic catastrophe. **(Smeltzer, C.S., et al 2010)**

A study on the burden of end stage renal disease in India showed that, the prevalence of chronic kidney disease at the community level was 8600 per million populations in Chennai, 7,852 per million populations in Delhi, and 151 per million populations in Bhopal. **(Mukhesh, khanna. 2009).**

A study conducted on nutritional therapy for patients undergoing hemodialysis, shows that protein energy malnutrition was a common problem seen in

hemodialysis patients. The nutritional therapy for hemodialysis patients was necessary to consider in patients with malnutrition. **(Kumagai, H. 2007).**

Durose, C., et al (2004) conducted a study to assess the knowledge of the diet and dietary compliance among patients on hemodialysis. The results showed that one third of patients on hemodialysis were non compliant with at least one dietary restriction. It was concluded that effective educational methods and new approaches were necessary to prompt the patients to comply with dietary and fluid restriction.

When the kidneys stopped working, hemodialysis removes wastes from the blood, but between dialysis sessions, wastes build up in the blood and results in sickness. A good meal plan can improve the dialysis and health of patients on hemodialysis

Accumulation of fluid causes swelling and weight gain. It affects blood pressure and makes heart work harder. The best way to reduce fluid intake was to reduce thirst that can be achieve by avoiding salty foods like chips and pickles. Drinking fluids from small cups or glasses, choosing low sodium foods were the other methods to keep fluids down. **(National Kidney and Urologic Diseases information Clearinghouse.2007)**

Potassium was a mineral found in many foods, especially fruits, milk, and vegetables. The right amount of potassium is maintained by healthy kidneys and is necessary to maintain the normal function of heart. Too much potassium can impair the heart function and may cause death. To control potassium levels in blood, avoid foods like banana, dried fruit, kiwis, which are rich in potassium **(National Kidney and Urologic Diseases Information Clearinghouse, 2007)**

Phosphorus, a mineral found in many foods. Too much phosphorus in blood causes decalcification of bones. This makes bones weak and often fractures. The patients on hemodialysis has to limit the intake of phosphorus rich food like dried beans, nuts, peas, milk and cheese.**(National Kidney and Urologic Diseases information Clearinghouse, 2007)**

Several studies showed that hemodialysis patients were at risk of malnutrition. The results showed that 20-75% prevalence of malnutrition was seen in hemodialysis

patients, cause a worse outcome and subsequently mortality. **(Singhania, P.R., et al 2013)**

A study on diet in chronic renal failure shows that a low protein diet was advocated to patients with chronic renal failure, to slow its progression. The restrictions of sodium, potassium and phosphate in diet had an impact on nutritional status. **(Tata, D., et al 2006).**

A study conducted on self care management in adults undergoing hemodialysis showed that clients with chronic kidney disease require continual care. It includes fluid restrictions, dietary restrictions, vascular care access and medications. **(Cleo, J. Richard, 2006).**

In hemodialysis, nutrition was very important in improving quality of life of patients and decreasing complications. Nutrition program plays a vital role in the process of treatment. Regular nutritional assessment was important in hemodialysis patient for early detection of malnutrition **(Esra, Gunes. 2012)**

A study conducted to assess nutritional status of patients undergoing hemodialysis (in 574 patients at brazil in 2012) showed, significantly prevalent malnutrition and shown association of malnutrition with socio demographic variables**. (Oliveira, G.T., et al. 2012)**

An article on nutritional needs and dietary modifications in patients on dialysis says the importance of nutritional assessment and the dietary modifications on patient to patient basis. It was concluded that studies can help in developing the guidelines for nutritional management of paints on hemodialysis by modifying and establishing the dietary requirement and supplementation. **(Sukhminder, Jit, Singh, Bajwa., et al. 2013).**

The impact of education on nutrition among hemodialysis patients was conducted in 70 patients and they were divided into two groups. Among 70 patients 35 received dietary counseling and others acted as controls. It shows that the quality of life was diminished in patients undergoing hemodialysis, but it was high in the group that got nutritional education. **(Alharbi, K, Enrione., et al. 2013)**

Dietary intervention in hemodialysis patients aims to limit the intake of specific nutrients in an attempt to control the accumulation of waste products during the inter-dialytic period. At the same time it is vital to meet the nutritional requirements of the patient by maintaining the overall adequacy of the diet To develop an effective nutritional management strategy, a comprehensive nutritional assessment should be performed and an individualized care plan developed for each patient. In addition, this plan should be updated frequently based on the patient's clinical condition and nutritional status and requirements. **(Pricilla, P. How. 2004)**

With the above mentioned studies and articles, the researcher understood the incidence and prevalence of malnutrition in hemodialyis was increasing which worsens the condition and results in mortality. Keeping this in view, the researcher justified the need to improve knowledge on nutrition in hemodialysis by developing individualized nutritional education among patients undergoing hemodialysis.

STATEMENT OF THE PROBLEM

"A Study to Assess the Effectiveness of Individualized Nutritional Education among Patients Undergoing Hemodialysis in GKNM Hospital, Coimbatore."

OBJECTIVES

1. To assess the nutritional status of patients undergoing hemodialysis.
2. To provide individualized nutritional education to patients undergoing hemodialysis
3. To compare the pretest and post test knowledge scores regarding nutrition among patients undergoing hemodialysis.
4. To find the association between pretest knowledge scores of nutrition with selected demographic variables of patients undergoing hemodialysis.

OPERATIONAL DEFINITIONS

Effectiveness: It refers the extent to which the Individualized Nutritional Education has achieved the desired effect as measured by gain in knowledge score.

Individualized Nutritional Education: It refers to systematically organized, individualized education on nutrition based on nutritional assessment.

Patients undergoing Hemodialysis: Patients with hypertension or cardiovascular diseases undergoing the treatment hemodialysis which involves shunting of patients' blood from body through a dialyzer where diffusion and ultra filtration occurs and then back into the patients circulation.

HYPOTHESIS

H_1: There will be a significant difference between pretest and post test knowledge scores regarding nutrition among patients undergoing hemodialysis.

H_2: There will be significant association between pretest knowledge scores on nutrition and selected demographic variables of patients undergoing hemodialysis .

ASSUMPTIONS

- Patients undergoing hemodialysis may have malnutrition.
- Patients undergoing hemodialysis may have baseline knowledge on nutrition.
- Individualized nutritional education may enhance knowledge on nutrition.
- The knowledge on nutrition of cardiac patients undergoing hemodialysis may vary with selected socio-demographic variables.

CONCEPTUAL FRAMEWORK

Conceptual framework or a model is made up of concepts which are the mental image of a phenomenon. These concepts are linked together to express the relationship between them. A model is used to denote symbolic representation of the concepts.

The conceptual framework for this study is based on "Theory of Goal Attainment" by Imogen King (1989). The theory focus on the relationship between the nurse and patient. It explains how the nurse – patient relationship can influence goals that are set and their level of achievement through transaction process model.

The main components of the model are interaction and transactions which are directly observable.

The present study aims at evaluating the effectiveness of individualized nutritional education among patients undergoing hemodialysis to enhance their knowledge.

This model focuses on interpersonal relationship between the investigator and patients undergoing hemodialysis in which, the interaction takes place between the investigator and patients undergoing hemodialysis and upon the perception of learning needs of both the investigator and patients undergoing hemodialysis. This interaction leads to mutual goal settings that are to be achieved by patients undergoing hemodialysis.

Perception

Perception is processes in which data obtained through the senses and memory is organized, interpreted and transformed, and are related to past experience, concepts of self and educational background.

In the present study the investigator and patients undergoing hemodialysis perceive the need to gain knowledge on nutrition. Both the investigator and patients undergoing hemodialysis set the goal to improve their knowledge on nutrition which helps them in preventing the complications and maintain the quality of life.

Judgment

It refers to the evaluation of the perception to make a decision to take action

Both the researcher and the patient undergoing hemodialysis decide to have an individualized nutritional education to improve their knowledge on nutrition in hemodialysis and to maintain nutritional status.

Action:

Action refers to mental or physical activity to be achieved.

During the action phase the investigator prepares the modified nutritional assessment tool to assess the nutritional status, the structured knowledge questionnaire to assess the knowledge of patients undergoing hemodialysis on nutrition and a individualized nutritional education on nutrition.

Reaction:

Reaction refers to the consequences or results of the action

In this study the reaction is the plan to implement the individualized nutritional education.

Interaction:

It is the process of perception and communication between the person and person, person and environment, represented by verbal and non-verbal behavioural that are goal directed.

In this study, the interaction takes place between the investigator, patients undergoing hemodialysis and their environment. During the interaction the investigator determines nutritional status, administers a structured knowledge questionnaire, and provides individualized nutritional education. Patients undergoing hemodialysis respond to the structured knowledge questionnaire and participate in the individualized nutritional education. As a result of this education programme, patients undergoing hemodialysis and the investigator enter into the transaction phase

Transaction

It is the observable behaviour of human being interacting with their environment. When transaction occurs between the nurse and the client, goals are attained. In the present study, patients undergoing hemodialysis gain knowledge on nutrition and which may help to maintain the nutritional status and thus improving their quality of life.

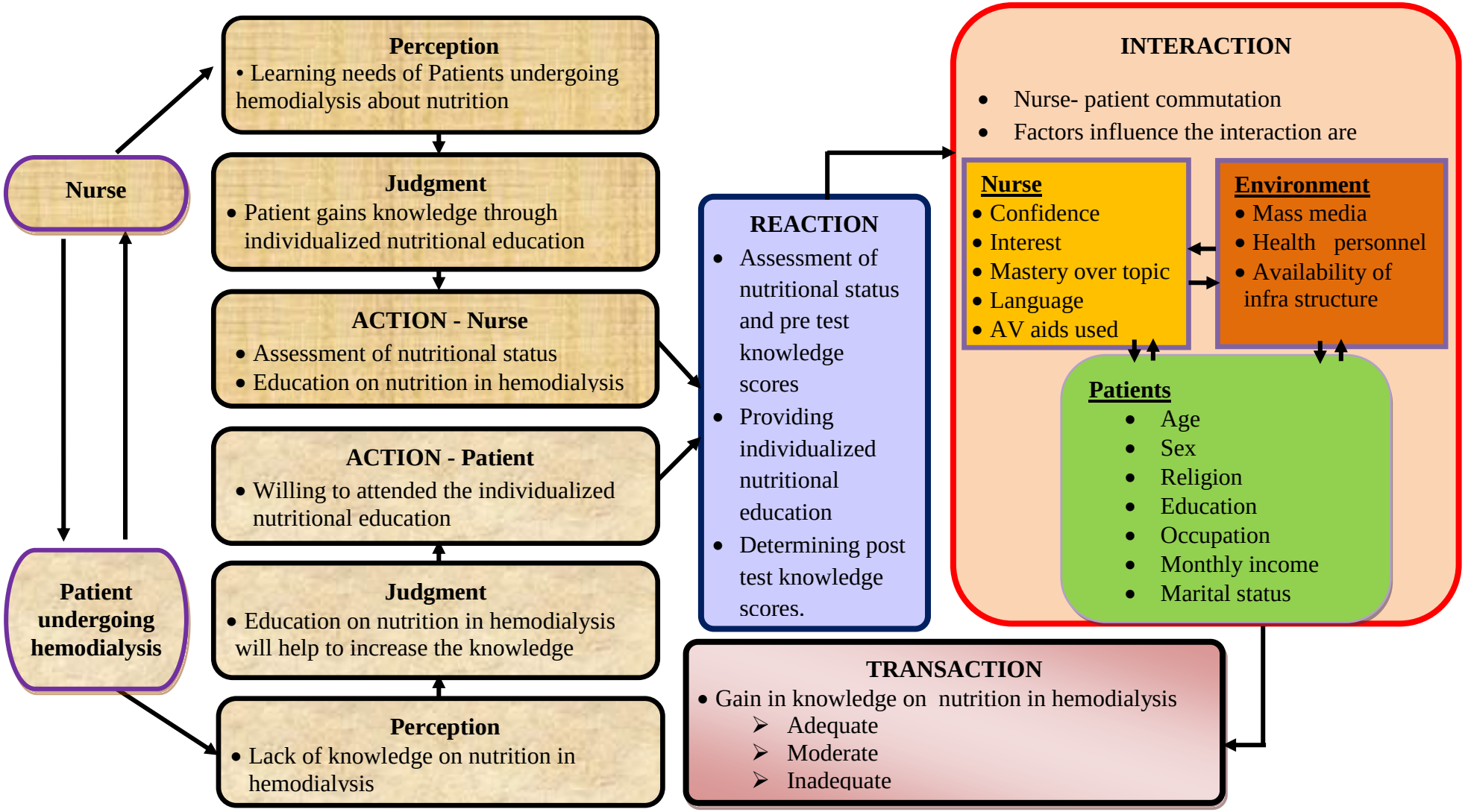


Fig-1.2 MODIFIED IMOGENE KING - TRANSACTION PROCESS MODEL

CHAPTER – II

REVIEW OF LITERATURE

Review of literature is a systematic search of published work to gain information about a research topic (**Polit, 2008).** An extensive review of literature was done by the investigator to lay a broad foundation for the study.

The review of literature is divided into three part

Section A: Studies related to the nutritional status assessment in patients undergoing hemodialysis

Section B: Studies related to the dietary and fluid regimen of hemodialysis patients

Section C: Studies supporting the need for education programme on nutrition for patients undergoing hemodilaysis

SECTION A: STUDIES RELATED TO THE NUTRITIONAL STATUS ASSESSMENT IN PATIENTS UNDERGOING HEMODIALYSIS

Kun, Zhang., et al (2013) conducted a study to assess the malnutrition and arterial calcification in hemodialysis patients. 68 hemodialysis patients were enrolled in this study. Nutritional status was evaluated among 68 patients undergoing hemodialysis using modified quantitative subjective global assessment. The result showed that 66.18% hemodialysis patients were malnourished. This study concluded that prevalence of malnutrition was high in patients undergoing hemodialysis.

Tabbi, A., et al (2012) conducted a cross sectional study to assess the prevalence of protein energy wasting in hemodialysis. The nutritional status of 291 hemodialysis patients was assessed by subjective global assessment. It was found that the prevalence of mild to moderate protein energy malnutrition was 60.5% and severe protein energy malnutrition was 1% in hemodialysis patients.

Agondi, Rde, F., et al (2011) conducted a cross- sectional study to determine the relationship between beliefs on low salt diet and interdialytic weight gain in patients on hemodialysis. 117 patients were included in the study and study revealed that there was a positive correlation between salt consumption and interdialytic

weight gain and negative correlation with education level of subjects with lower schooling.

Perunicic-Pekovic, G., et al (2008) conducted a study to establish an association between inflammatory markers and parameters of malnutrition in hemodialysis. Blood samples from 42 hemodialysis patients were taken after an overnight fasting and standard doppler echo and echocardiography were used to determine cardiac functions. Result showed cardiovascular disease and carotid plaques were significantly high in malnourished patients. This study was concluded that the prevalence of inflammation, malnutrition, cardiovascular disease and carotid plaques were found high in patients on hemodialysis.

Segall, L., et al. (2008) conducted a cross-sectional study to evaluate nutritional status in maintenance hemodialysis patients. 149 hemodialysis patients were evaluated by anthropometry, biochemical tests and bioelectrical impedance analysis (BIA). It was found that in hemodialysis patients, advancing age, diabetes, heart failure and decreasing hemoglobin levels were associated with worse nutritional status.

Tirmenstajn-Jankovic, B., et al. (2007) conducted a study to investigate the relationship between nutritional status, serum albumin concentration and C-reactive protein in patients on regular hemodialysis. Subjective global assessment, anthropometric and laboratory measurements were used to evaluate nutritional and inflammatory status in 43 hemodialysis patients. According to subjective global assessment, malnutrition was present in 46.5% patients on haemodialysis. The study concluded that malnutrition and chronic inflammation are important determinants of hypoalbuminemia**.**

Perunicic-Pekovic, G.B., et al. (2007) conducted a study to establish a correlation between markers of inflammation and parameters of malnutrition in hemodialysis patients. The study consisted of 42 hemodialysis patients and for nutritional assessment, subjective global assessment, anthropometric parameters, bio-electric impedance, and biochemical nutritional parameters were used. Result showed that there was a negative correlation between serum albumin concentration and inflammatory markers Anthropometric parameters

in hemodialysis patients were lower when inflammatory markers were higher and correlation was significant. The study concluded that the decreased nutritional parameters in hemodialysis patients were related to the degree of inflammation.

Araujo, I.C., et al (2006) conducted a retrospective study to evaluate the impact of parameters of nutrition at the time of initiation of hemodialysis on mortality. 344 incident hemodialysis patients whose nutritional status was evaluated for three months before initiation of hemodialysis were included. The result showed that diabetes, advanced age, and hypoalbuminemia, and the low energy intake were independent predictors of death in incident HD patients**.**

Loctelli, F., et al (2002) conducted a study on assessment of nutritional status of dialysis patients in Germany. The study was done based on clinical assessment and biochemical parameters. Findings revealed poor health status due to malnutrition which is common in dialysis patients**.**

William, F. Martin., et al (2002) conducted a descriptive study to assess the nutritional status of fifty patients on maintenance hemodialysis in Yamen. The anthropometric mean, pre and post dialytic weight, clinical signs and malnutrition score was calculated from body mass index. The study results showed that 16% of patients on maintenance hemodialysis were moderately malnourished and 20% were severely malnourished. The study concluded that poor dietary knowledge and practice had an association with poor nutritional status.

SECTION B: STUDIES RELATED TO THE DIETARY AND FLUID REGIMEN OF HEMODIALYSIS PATIENTS

Unruh, M.L., et al (2010) conducted a study to assess whether skipping hemodialysis treatments and failure to adhere in dietary prescription injure patients on hemodialysis. Among 739 patients, 67 were considered skippers. The findings showed that patients who use illicit drugs or tobacco were at risk for skipping hemodialysis treatments. Markers of poor dietary adherence and skipping treatments were strongly associated with risk of death.

Mun, Yoke, Chan, mail., et al (2009) conducted a cross-sectional study to identify factors influencing medication, dietary, fluid and dialysis compliance

behaviours in hemodialysis. From 14 dialysis centres 188 hemodialysis patients were recruited. Biochemical measurements and self reported compliance behaviours were used as evaluation tools. The study result showed that, patients on long term hemodialysis and working patients who were younger males were found to be non-compliant. It was concluded that healthcare professionals should identify the factors hindering compliance and assist them to make necessary changes as possible.

Kamyar kalantar,, zedeh. (2008) conducted a study to find the association between fluid retention and cardiovascular mortality in patients undergoing hemodialysis. The investigator examined 2-year mortality in 3,4107 patients undergoing hemodialysis across United States. The findings of the study show that fluid retention in hemodialysis patients was high between two subsequent sessions of hemodialysis and was associated with high risk of cardiovascular death.

Fincham, D., et al (2008) conducted a study among 62 patients on assessing dietary and fluid adherence among hemodialysis patients attending public sector. Hierarchical regression analysis revealed that theory of behavior was able to significantly explain 15.5% of the variance in self reported dietary and fluid adherence.

Judson, B. Pollock., et al (2007) conducted a comparative study on knowledge of phosphorous versus other nutrients (potassium, sodium, protein) in hemodialysis and peritoneal dialysis patients. Among 47 patients, 18 patients were on peritoneal dialysis and 29 patients were on hemodialysis. Knowledge on nutrition was assessed using functional health literacy knowledge tool. The results revealed that knowledge on phosphorus was poor when compared with knowledge of other nutrients. The study concludes that despite continuous dietary instruction, patients on maintenance hemodilaysis had a poor knowledge of dietary phosphorus content.

Belguzar, K., et al (2007) conducted a descriptive study to describe non – adherence with diet and fluid restriction and level of perceived social support in Turkey among 160 hemodialysis patient. Data was collected using fluid non adherence questionnaire and multidimensional scale of perceived social support. Result showed that most patients in the study adapted some degree of non-adherence to fluid restriction (68%) and diet (58%).

Claudia, Morales, Lopez., et al (2007) conducted a cross sectional study to identify the factors that influence dietary adherence in patients receiving maintenance hemodialysis. Information on preferred language for education, knowledge of diet, consumption of phosphate and potassium containing food and behaviours and adherence attitudes were collected. The study results showed that patients on hemodialysis were adherent to diet and their level of serum potassium; phosphate and albumin were within acceptable limits.

Christian S.S., et al (2006) conducted a study to find out the association between protein intake and survival in patients on hemodialysis. Study concluded that low intake of dietary protein was associated with risk of death in maintenance hemodialysis patients.

Jiro, Takaki. and Eiji, Yano. (2006) conducted a study to assess the relationships of self-efficacy with compliance in patients on hemodialysis. Self efficacy tool was used to assess health behaviour and interdialytic weight gain, serum potassium and blood urea nitrogen were used to measure compliance. The study results showed that female patients who had high self efficacy were less compliant.

Kugler, C., et al. (2005) conducted a cross sectional study to describe the prevalence of non adherence with prescribed diet and fluid restriction among 916 hemodialysis patients through a structures questionnaire method over a period of 1 year. The results showed that in many patients had difficulty in following diet (81.4%) and fluid (74.6%) restrictions. Younger male patients and smokers were at highest risk for non adherence. Higher level of inter dialysis weight gain were associated with non adherence.

Durose. C.L, et al (2004) conducted a study to investigate whether knowledge of the diet and medical consequences had an influence on dietary compliance in hemodialysis patients. Seventy one of the eligible 82 patients participated in the study. Interviewer administered questionnaire & assessed the knowledge. The findings of the study showed that more than 1/3 of patients were non compliant with at least one dietary restriction.

White, R.B. (2004) conducted a case study that showed the importance of dietary adherence. Riled Skiley is a 64-year-old woman with End Stage Renal Diseaase

caused by long-standing hypertension. Within 2 months of initiating hemodialysis, Riled Skiley has had six episodes of excessive interdialytic weight gain, averaging about 6 kg (these typically happen on Mondays). After the most recent occurrence, the nurse talked with Riled Skiley to obtain a detailed psychosocial history and the nurse discussed how overindulgence during these dinners is contributing to the swelling that Riled observed, and the negative health ramifications that resulted. Riled and the nurse jointly devised a plan to convene a meeting with the family to solicit their understanding and support for Riled adherence to dietary and fluid restrictions. Outcomes improved immediately, and Riled had no excessive interdialytic weight gain for the next 3 weeks--the nurse continued to provide ongoing encouragement**.**

Mantik, Sharon, Lewis., et al. (2004) written in their book, about initiative guidelines given by national kidney foundation and kidney disease outcome quality initiative center, both for non dialyzed and hemodialysed patients as to calculate energy intake of 35kilocalorie per kilogram of body weight for patients below 60 years of age.1.2 gram of protein restriction and 2g potassium restriction in diet. 1g phosphorous restrictions in phosphorous levels were related to the diminished function of the kidney to remove excess phosphorous from the body leading to hyperphosphatemia.

Davison, A.M., (2003) written in his book that numerous studies shows the factors that influencing the morbidity and mortality of dialysis patients were underlying disease or consequence of co morbid condition that result from either inadequate predialysis care, poor compliance to dietary and fluid regimen or late referral to specialized nephrology team.

Vlaminck, H., et al (2001) conducted a cross-sectional study in Hungary on 107 samples to assess dietary self efficacy, compliance attitude & behaviors' and staff patient relationships and laboratory outcomes. Results indicated that dietary self-efficacy determined both behaviors and laboratory outcomes. Patient with greater dietary self-efficacy had lower serum potassium and weight gain, showed favorable compliance attitudes and behaviors toward prescribed regimen and fostered better relationship with staff.

Sharma, M., et al (1999) conducted a study to assess impact of super bowel parties on nutritional parameters among hemodialysis patients. Findings revealed that 15 patients who attended a party had increased serum phosphorous level and interdialytic weight gain from baseline. These increases were statistically significant compared with patients who did not attend a party.

Lopex, C.M. (1999) conducted a study on assessment of nutritional compliance among patients in dialysis centers of National Kidney Foundation & to identify common reason behind lack of compliance. The results were self reported nutritional compliance among hemodialysis patients was 94% when compared to actual compliance of 48%. Common reason behind lack of compliance were lack of family support, financial constraints, co existing morbidities, misinformed calorie intake & unwillingness to change life style.

Sabina, D.G., et al (1998) conducted a study on the prevalence & consequence of non adherence to hemodialysis regimen. Findings of study revealed that about 40% of samples were having shortness of breath, muscle cramping, lung edema and hypertension due to non adherence with fluid restriction.

SECTION C: STUDIES SUPPORTING THE NEED FOR EDUCATION PROGRAMME ON NUTRITION FOR PATIENTS UNDERGOING HEMODILAYSIS

Nader, Aghakhani., et al. (2012) conducted a comparative study to assess the effectiveness of education on nutrition in patients on hemodialysis. Among 70 maintenance hemodialysis patients, 35 patients received dietary counseling and rest acted as controls. The result showed that score was higher in the group who received counseling. This study concluded that one of the methods for improving quality of life in hemodialysis is education on nutrition.

Bárbara, Margareth, Menardi, Biavo1., et al. (2011) conducted a study to assess the impact of a nutritional education program using the transtheoretical model of eating behavior change to control hyperphosphatemia in hemodialysis patients. This study included 189 patients who exhibited phosphorus concentrations $\geq$ 5.5 mg/dl. The nutritional intervention consisted of lectures and group dynamics sessions performed during dialysis sessions. The results showed that after the nutrition

intervention there was a significant reduction of the serum phosphorus concentration, and most patients exhibited positive changes in their eating behaviors. This study concluded that nutritional intervention through an education program is an effective tool to reduce hyperphosphatemia in hemodialysis patients**.**

Soto, Marisela. (2011) carried out a qualitative and descriptive study was conducted to find out the barriers among adults on dialysis that affects the medication compliances among 30 patients . The study results showed that difficulty in understanding instructions, difficulty in paying for medications, stopping medication when feel sick and forgetfulness were the commonest barrier in medication compliance. The study concluded that noncompliance dialysis patients require major changes in lifestyle including dialysis, strict diet, fluid restriction and medication through proper teaching programme.

L. Fathima. (2004) conducted a pre-experimental study to assess the effectiveness of education on knowledge of home care management in patients on hemodialysis. Through non probability sampling technique 30 samples were selected from Vijaya dialysis unit, Chennai. The findings of the study suggested that the knowledge on home care management were increase in patients.

K. Y. Fung., et al (2004) conducted a cross sectional cohort study to evaluate the effectiveness of knowledge of patient in improving calcium-phosphate balance among hemodialysis patients. The patients were interviewed to determine their knowledge of phosphate binders, dietary restrictions and compliance. 31 patients were enrolled in the study and 30 patients were kept as controls. In the control group, no formal counseling was done. Formal counseling was given to the study group about the importance of maintaining dietary regulations and taking phosphate binders. After counseling 39% of patients in the study group were having significant decrease in the serum phosphate level, which showed an increase in the knowledge level regarding phosphate binders and dietary restrictions.

H. Kierdorf., et al (2004) conducted a descriptive study to explore detailed knowledge on dietary management of 39 haemodialysis patients attending a single haemodialysis centre, North Wales, London concerning food sources, clinical sequel of fluid gain, biochemical control alongside measurement of dietary compliance and

psychological factors. Patients completed a detailed 26 item renal dietary knowledge questionnaire measuring knowledge of clinical consequences of dietary behavior as well as content of food sources. The result showed that 59% patients reported full understanding of their dietary advice while 41% requested further advice over potassium and phosphate.

Ford, J.C., et al (2004) conducted a quasi experimental study to find out the effect of dietary education on the laboratory values among patients undergoing hemodialysis. Structured teaching programme was given to 63 patients. The result showed that those patient who receive extra education monthly showed positive changes which may be beneficial in reducing hyper phosphatemia. The study concluded that an education intervention can bring about a desirable change in knowledge among hemodialysis patients regarding diet.

Ravani, D., et al. (2003) conducted a study to determine the structured pre dialysis programme among 229 hemodialysis patients through structured interview schedule. The study concluded that a structured pre dialysis education programme was necessary to improve early dialysis .

Norrie, K., et al (2003) conducted a descriptive study on the awareness of kidney disease, among Africans and Americans. The results showed that African Americans' awareness of kidney disease was high that is about 70% but knowledge of the magnitude of the disease, its symptoms, its predisposing risk factors, and strategies for prevention and treatment were low that is only 38%. These results served to justify the need for continued patient education to all individuals.

CHAPTER – III

METHODOLOGY

Research methodology is the systematic way to solve the research problem. Methodology is one which enables the researcher to project a blue print of the research undertaken

RESEARCH APPROACH

Quantitative research approach is selected for assessing the effectiveness of individualized nutritional education among patients undergoing hemodialysis

RESEARCH DESIGN

The research design provides an overall plan for conducting the study.

Pre-experimental one group pretest posttest design was selected for this study.

Level of malnutrition and level of knowledge on nutrition among patients undergoing hemodialysis were assessed during pretest. The pretest score was used as a base to compare with the posttest score. Difference in pretest and posttest score attributes the effectiveness of individualized nutritional education on improving knowledge among patients undergoing hemodialysis

FIGURE: 3.1 - SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY

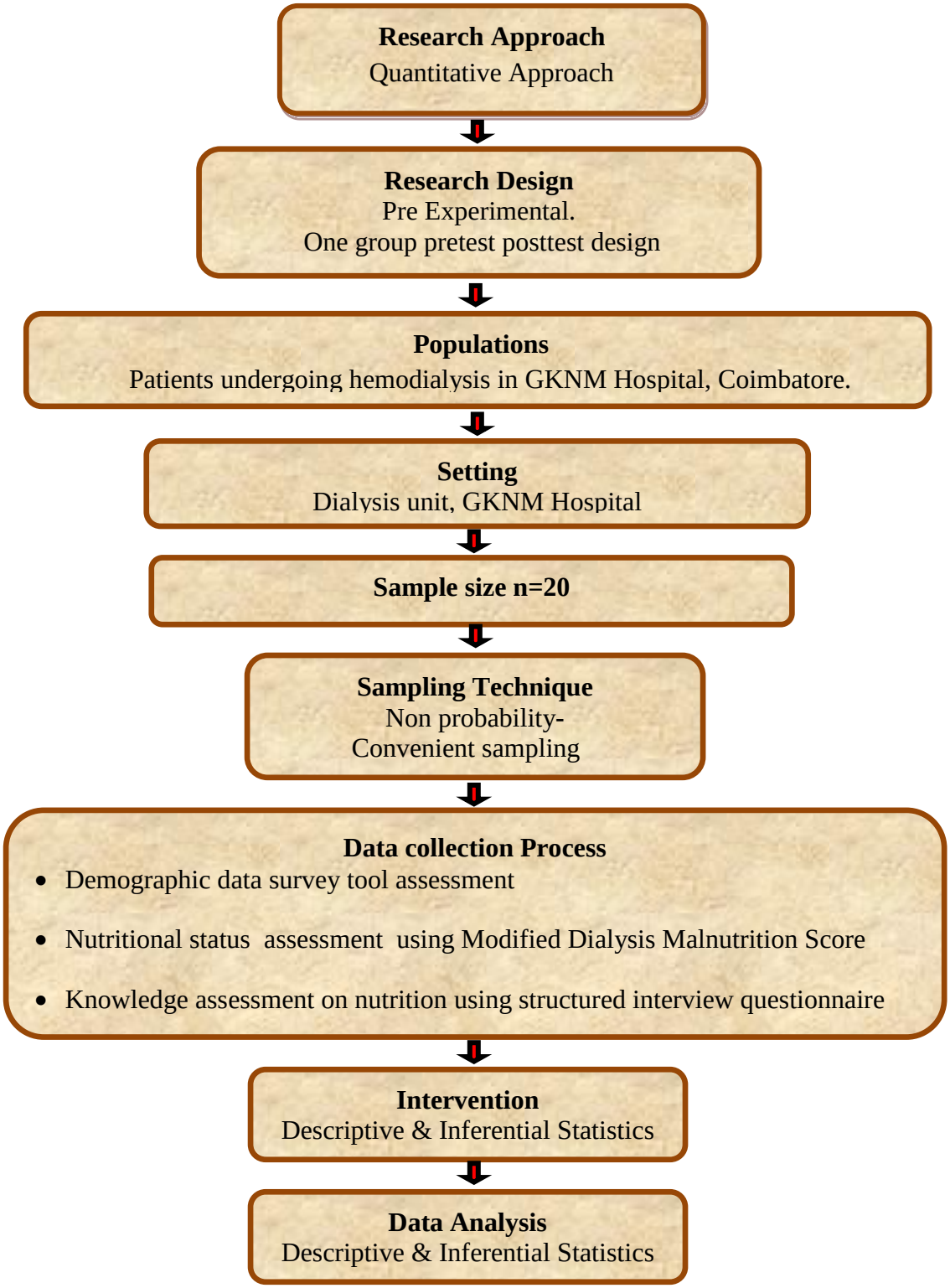
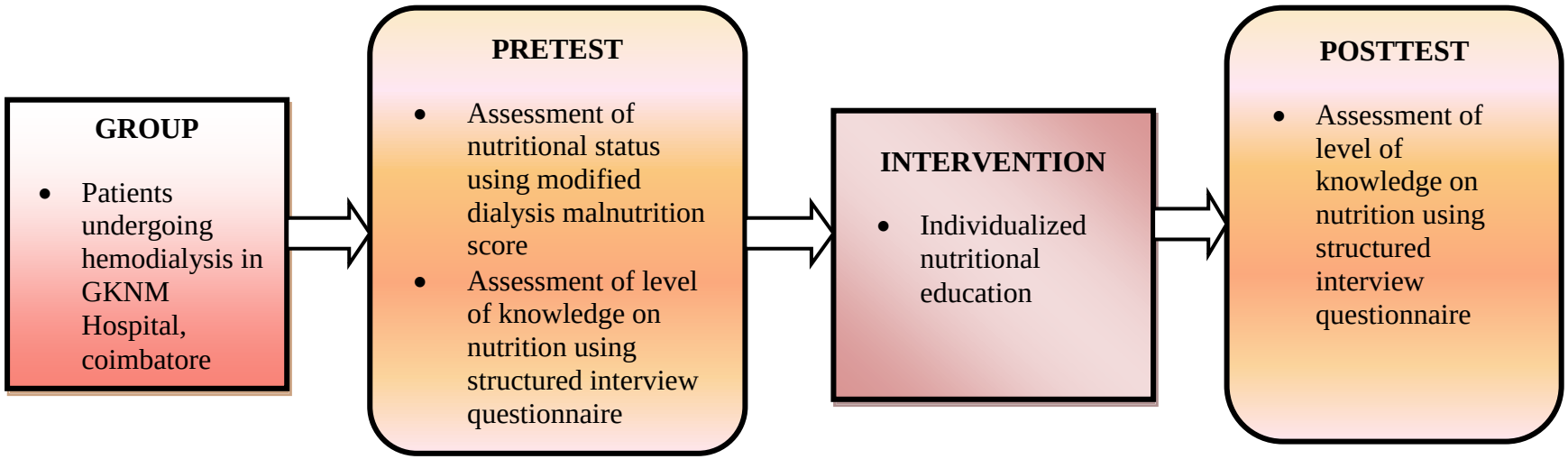


FIGURE 3.2: SCHEMATIC REPRESENTATION OF RESEARCH DESIGN



VARIABLES

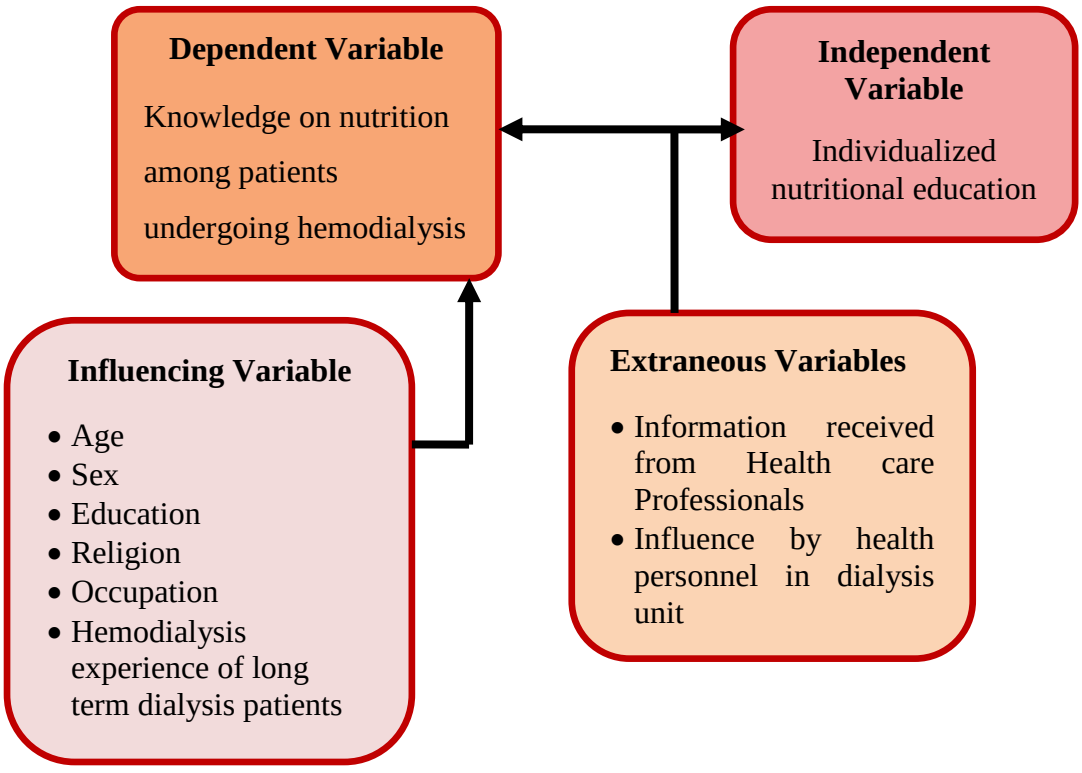
Influencing Variable: Age, sex, education, religion, occupation, monthly income, hemodialysis experience of long term dialysis patients

Independent Variable: Individualized nutritional education

Dependent Variable: Knowledge on nutrition among patients undergoing hemodialysis

Extraneous Variables: Information received from Health care Professionals, influence by health personnel in dialysis unit.

FIGURE 3.3- SCHEMATIC REPRESENTATION OF VARIABLES



SETTING OF THE STUDY

The study was conducted in the dialysis unit of GKNM Hospital, Coimbatore. The dialysis unit is a 6 bedded unit and equipped with advanced technological instruments and equipments.

POPULATION

Population of study comprised of patients undergoing hemodialysis.

SAMPLE SIZE

The sample size was determined, using **Mahajan's formula**.

Sample size $(n) = \frac{4Pq}{L^2}$

P = percentage of population

q = 100-P

L = Allowable error

P = (17/143X100) =11.89

q = 88.11

L = 15

$(n) = \frac{4Pq}{L^2} = (4x11.89x88.11)/ 225 = 18.62$

According to this, it was decided to select 20 samples for the study.

SAMPLING TECHNIQUE

Non probability - convenient sampling technique was adopted for the study.

SAMPLING CRITERIA

Inclusion Criteria

- Patients with cardiac problems and during study period.
- Patients who were conscious and oriented
- Patient who was able to understand either Tamil or English

Exclusion Criteria

- Patients who were not willing to participate in the study.
- Patients who were critically ill.
- Patients with visual and auditory impairment

DESCRIPTION OF THE TOOL

The tool consists of 4 sections, section A B C & D. the sections are as follows

- Section A – Baseline data
- Section B – Patient assessment
- Section C – Part A : General nutritional assessment

  Part B: Modified dialysis malnutrition score
- Section D – Structured interview questionnaire

Section A- Baseline Data

It includes

- Demographic data of client such as, Age, Sex, Religion, Education, Occupation, Monthly income, Marital Status
- Patient data such as diagnosis, co morbid diseases, current medications, overall patient health status, details of dialysis, prescribed dietary and fluid restriction

Section B- Patient assessment

It includes

- General assessment (vital signs, general appearance, skin, hair, and nails),
- System assessment (musculoskeletal system, gastrointestinal system, urinary system)

Section C- Nutritional Assessment

Part- A: General nutritional assessment

- Height, weight, mid arm circumference, skin fold thickness, body mass index, ideal body weight, and 24 hours dietary recall

Part- B: Modified Dialysis Malnutrition Score

- It is a 5 point scale developed from 2 standardized tools for assessing malnutrition status of hemodialysis patients such as :

- Dialysis Malnutrition Score (DMS) or Modified Subjective Global Assessment tool,
- Malnutrition Inflammation Score (MIS)

Modified dialysis malnutrition score is a 5 point rating scale that includes:

- 6 components of patient related medical history (weight change, dietary intake, gastrointestinal symptoms, respiratory symptoms, functional capacity, and co-morbidity).
- 4 components of physical examination (decreased fat stores / loss of subcutaneous fat, signs of muscle wasting, BMI, percentile ideal body weight)
- 6 components of laboratory parameters (S.albumin, S. urea, S. creatinine, Hemoglobin, Random Blood Glucose, S. potassium)

In Modified Dialysis Malnutrition Score the level of nutritional status was categorized as well nourished, mild to moderately malnourished, and severely malnourished.

Section D - Structured Interview Questionnaire

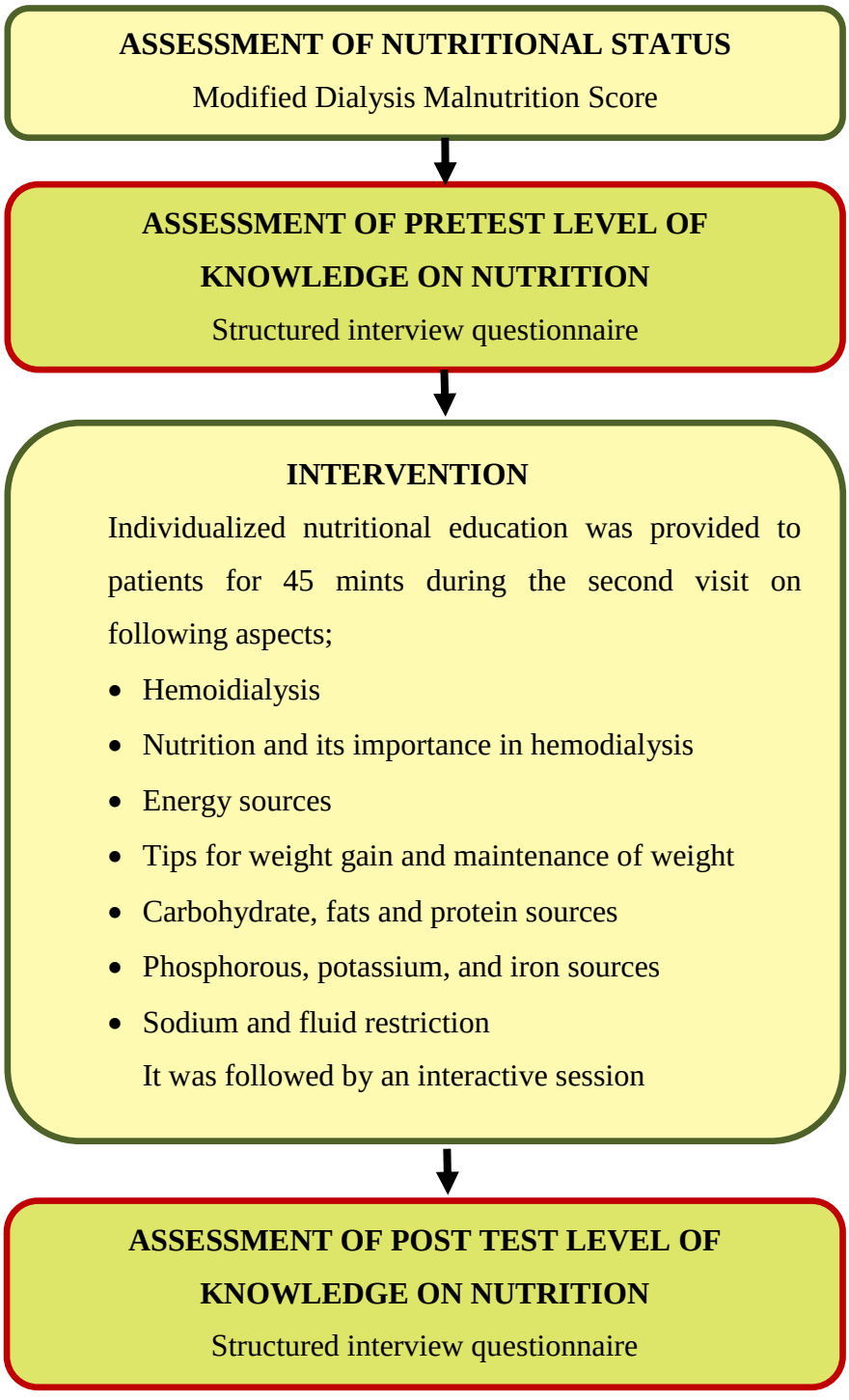
It includes structured interview questionnaire to assess the knowledge about nutrition among patients undergoing hemodialysis.

Every "right" response was awarded a score "1" and every "wrong" response was awarded a score of "0". Thus 25 marks were the total scores allotted for knowledge on nutrition.

DESCRIPTION OF THE INTERVENTION

During the first visit of data collection patients were interviewed using the structured interview guide, assessed for their level of nutritional status using modified dialysis malnutrition score and level of knowledge on nutritional education using structured knowledge questionnaire. The individualized nutritional education was provided to patients undergoing hemodialysis and the posttest was performed during the fourth visit.

FIGURE:-3.4 SCHEMATIC REPRESENTATION OF INTERVENTION



VALIDITY

The tool was submitted for content validity to the experts in the field of Nephrology and Medical Surgical Nursing. Based on the expert's suggestions and recommendations, the tool and teaching module were revised and then finalized.

RELIABILITY

- Reliability of the tool was determined using the Split half technique.
- The calculated r (co efficient of co-relation) value for modified dialysis malnutrition score was 0.95 with value r' (co efficient of reliability) as 0.97
- For the structured knowledge questionnaire r value was 0.89 with r' value 0. 94.
- Reliability was computed using the following equation:

$$r = \frac{\sum(X-\bar{X})(Y-\bar{Y})}{\sqrt{\sum(X-\bar{X})^2 \times \sum(Y-\bar{Y})^2}}$$

$$r' = \frac{2r}{1+r}$$

ETHICAL CONSENT

Consent to conduct the study was obtain from the ethical committee of GKNM Hospital, Coimbatore

PILOT STUDY

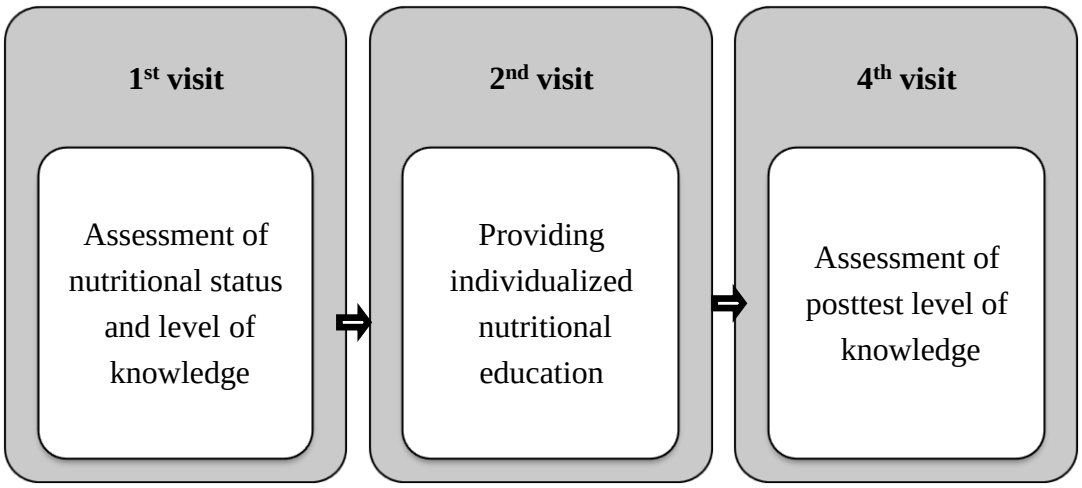
The pilot study was conducted in dialysis unit of G. Kuppuswamy Naidu Memorial Hospital, Coimbatore, for a period of 2 weeks from 15.07.2013 to 26.07.2013. A total of 5 samples were included in the study using convenient sampling technique. Informed consent was obtained and demographic data were collected from the participants. Structured interview guide was used to assess the level of knowledge and individualized nutritional education was provided to the subjects. The results showed that, the individualized nutritional education was effective in improving the knowledge on nutrition among patients undergoing hemodialysis. Upon completion of pilot study, the feasibility & practicability of the tool were established. Based on the pilot study results necessary changes were made to the tool.

DATA COLLECTION PROCEDURE

The data collection period was for four weeks. Data were collected every day from 29. 07. 2013 to 24. 08. 2013. The samples selected were given self introduction and oral consent obtained. The participants were assured of confidentiality about data collected and assured them that it will be used only for research purpose. The level of nutritional status and pretest level of knowledge on nutrition were assessed, on the first visit to dialysis unit.

During second visit individualized nutritional education was provided and was followed by an interactive session for the patient to clarify their queries and to furnish with adequate explanations.On the day fourth visit, Post test level of knowledge was assessed using the same scale used for pre test.

FIGURE:-3.5 SCHEMATIC REPRESENTATION OF DATA COLLECTION PROCEDURE



PLAN FOR DATA ANALYSIS

- The data collected from subjects was compiled and analyzed using descriptive statistics such as frequency, mean, percentage and standard deviation.
- The effectiveness of the structured teaching program, was tested using the paired ‘t’ test.
- The association between pretest knowledge scores on nutrition with selected demographic variables of the subjects was tested using the chi square test.

CHAPTER - IV

ANALYSIS AND INTERPRETATION

Analysis is defined as the process of systematically applying statistical and logical techniques to describe, summarize and compare data.

-Suresh K. Sharma (2011).

This chapter deals with the analysis and interpretation of data collected from 20 patients undergoing hemodialysis. The analysis was carried out with descriptive and inferential statistics and findings are tabulated and described as follows: -

Table 4.1(a): Distribution of demographic variables of patients undergoing hemodialysis.

Table 4.1(b): Distribution of patients undergoing hemodialysis according to patient history

Table 4.2: Distribution of patients undergoing hemodialysis according to patient assessment data

Table 4.3: Distribution of patients undergoing hemodialysis based on nutritional status

Table 4.4: Distribution of pretest and post test knowledge scores on nutrition among patients undergoing hemodialysis.

Table 4.5: Comparison of pretest and post test level of knowledge on nutrition amond patients undergoing hemodialysis.

Table 4.6: Association between pretest knowledge scores on nutrition and selected demographic variables of patients undergoing hemodialysis

TABLE 4.1(A): DISTRIBUTION OF DEMOGRAPHIC VARIABLES OF PATIENTS UNDERGOING HEMODIALYSIS

n = 20

Sl no	Demographic variables		Frequency	Percentage
1	Age	a) 1-50	7	35
		b) 1- 60	7	35
		c) 61-70	5	25
		d) Above 71	1	5
2	Sex	a) Male	15	75
		b) Female	5	25
3	Religion	a) Hindu	19	95
		b) Muslim	1	5
4	Education	a) School level	12	60
		b) Under graduate	6	30
		c) Post graduate	2	10
5	Occupation	a) Unemployed	5	25
		b) Self employed	3	15
		c) Retired	12	60
6	Marital status	a) Married	17	85

		b) Unmarried	3	15
7	Income	a) Rs-10,000/-	4	20
		b) RS-10,001-20,000/-	15	75
		c) Rs- 20,001-30,000/-	1	5

Table 4.1(a) reveals the distribution of the following demographic variables of subjects:

Age: 7(35%) of the subjects were in the age group of 1-50 and 51-60, 5(25%) of the subjects were in the age group of 61-70 and 01(5%) were above 70.

Sex: Majority of subjects were males ie, 15 (75%) and 5 (25%) were females.

Religion: With regard to religion, majority of subjects were belongs to Hindu religion ie, 19(95%) and 01(5%) were in Muslim religion.

Education: Considering the educational level, 12(60%) had school level education, 6(30%) were undergraduates, 02(10%) were postgraduates

Occupation: Regarding occupation of subjects, 12 (60%) of subjects were retired, 5 (25%) were unemployed and 3(15%) were self employed.

Monthly income: 15 (75%) of subjects had a monthly income of Rs 10001-20000, 4(20%) had monthly income of Rs < 10000 and only 1(5%) belonged to a monthly income of >Rs 20001-30000.

Marital status: Majority 17 (85%) of subjects were married and 3(15%) of subjects were unmarried

FIGURE 4.1: DISTRIBUTION OF PATIENTS UNDERGOING HEMODIALYSIS ACCORDING TO AGE

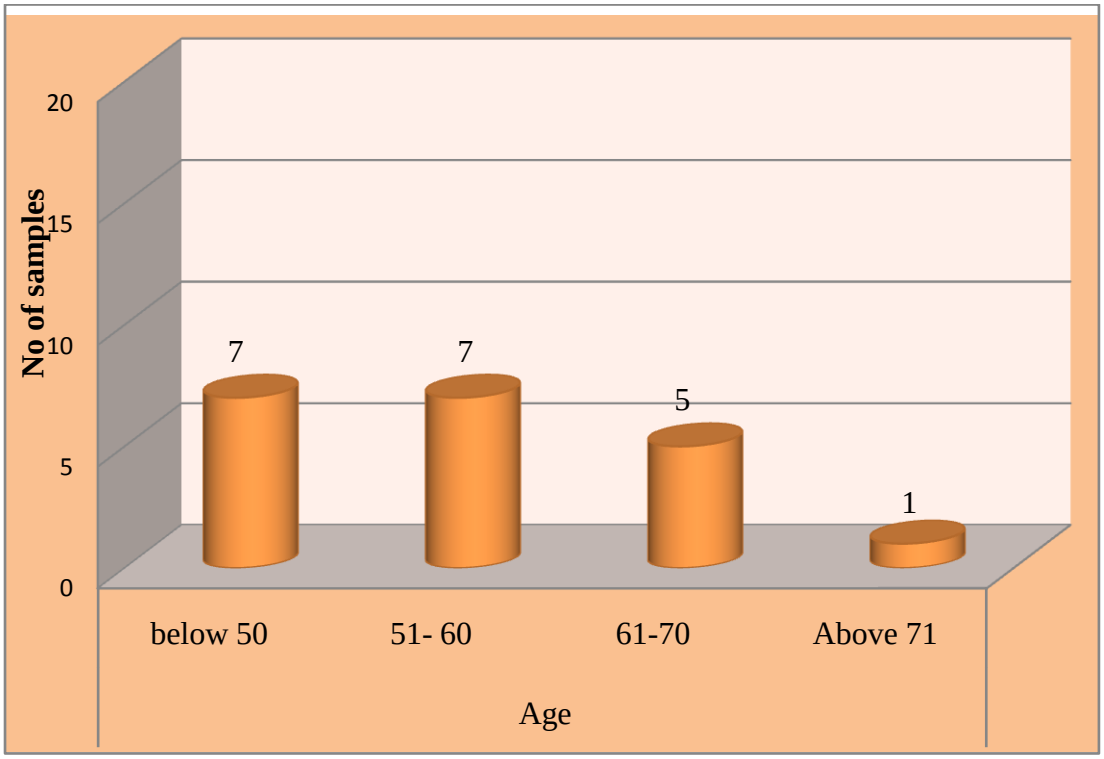


FIGURE 4.2: DISTRIBUTION OF PATIENTS UNDERGOING HEMODIALYSIS ACCORDING TO EDUCATION

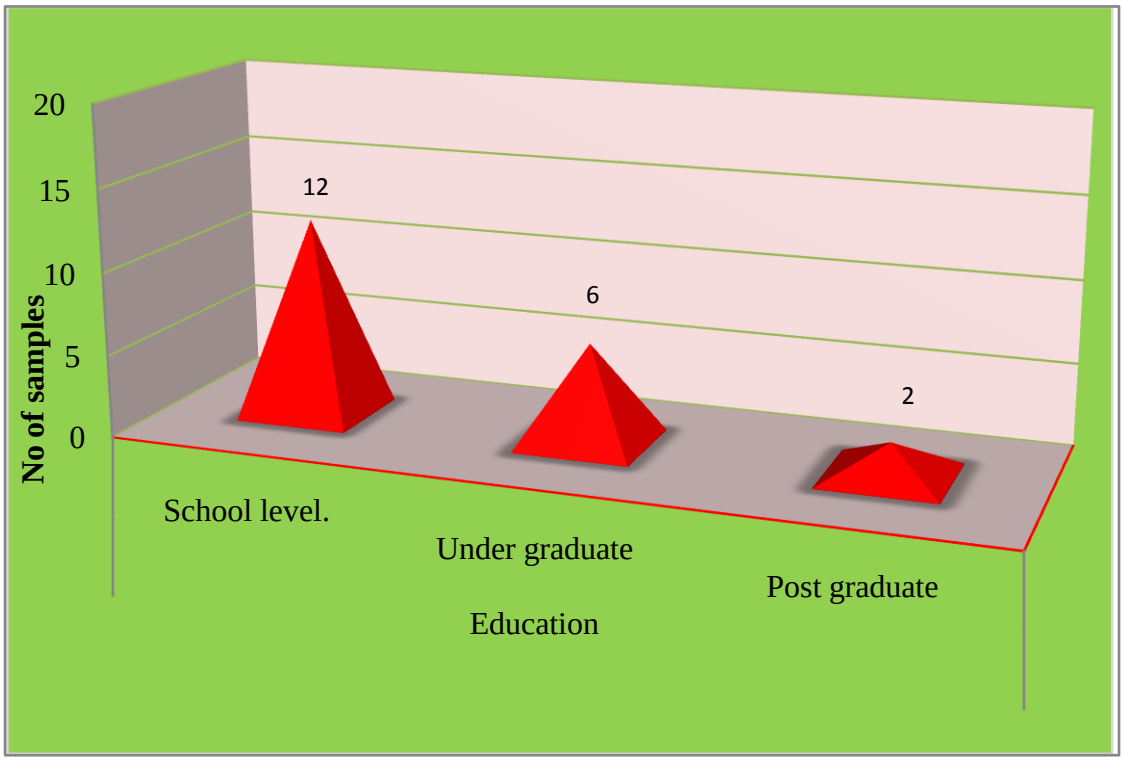


TABLE 4.1(B): DISTRIBUTION OF PATIENTS UNDERGOING HEMODIALYSIS ACCORDING TO PATIENT HISTORY

n=20

Sl no	Patient history		Frequency	Percentage
1	Type of kidney	a) Own	19	95
		b) Transplanted	1	5
2	Co morbid disease	a) HTN	5	25
		b) HTN &DM	8	40
		c) HTN/CV diseases with other diseases	7	35
3	Overall health status	a) Good	2	10
		b) Fair	13	65
		c) Poor	5	25
4	Type of access	a) AV fistula	16	80
		b) Jugular vein	3	15
		c) Subclavian	1	5
5	Period of hemodialysis	a) >1yrs	19	95
		b) 1-3yrs	1	5
6	No of session in a week	a) 2	19	95
		b) 3	1	5

7	Duration of each session	a) 3 hrs	1	5
		b) 4 hrs	18	90
		c) <4 hrs	1	5
8	Blood trasfusion during dialysis	a) Yes	18	90
		b) No	2	10
9	Intradialytic parentral therapy	a) Yes	1	5
		b) No	19	95
10	Patient compliance with dietary advice	a) Yes	19	95
		b) No	1	5
11	Patient compliance with fluid restriction prescribed	a) Yes	18	90
		b) No	2	10

Table 4.1(b) reveals the distribution of patients undergoing hemodialysis on the basis of patient history:

Type of kidney: Majority 19(95%) had own kidney, only 1(5%) had transplanted kidney.

Co morbid diseases: Most of the subjects had hypertension and diabetes mellitus, 7(35%) has hypertension or cardiovascular diseases with other diseases and 5(25%) had hypertension.

Period of hemodialysis: 19 (95%) subjects were undergoing hemodialysis for >1 years and only 1(5%) were of 1- 3 years.

No of session in a week: 19(95%) subjects were undergoing 2 sessions in a week and only 1(5%) were undergoing 3 sessions in a week.

Duration of each session: Considering the duration of each session 18(90%) were undergoing for 4 hours, 1(5%) were for 3 hours and 1(5%) were for <4 hours.

Blood transfusion during dialysis: - Majority 18(90%) of subjects were undergone blood transfusion during dialysis and 2(10%) were not.

Intradialytic parentral therapy: 19(95%) of subjects were not undergone intradialytic parentral therapy and only 1(5%) were undergone.

Patient compliance with dietary advice: 19(95%) were compliant with dietary advice and 1(5%) was not.

Patient compliance with fluid restriction: 18(90%) of subjects were following the fluid restriction as per the advice and 2(10%) were not.

FIGURE 4.3: DISTRIBUTION OF PATIENTS UNDERGOING HEMODIALYSIS ON THE BASIS OF COMORBID DISEASES

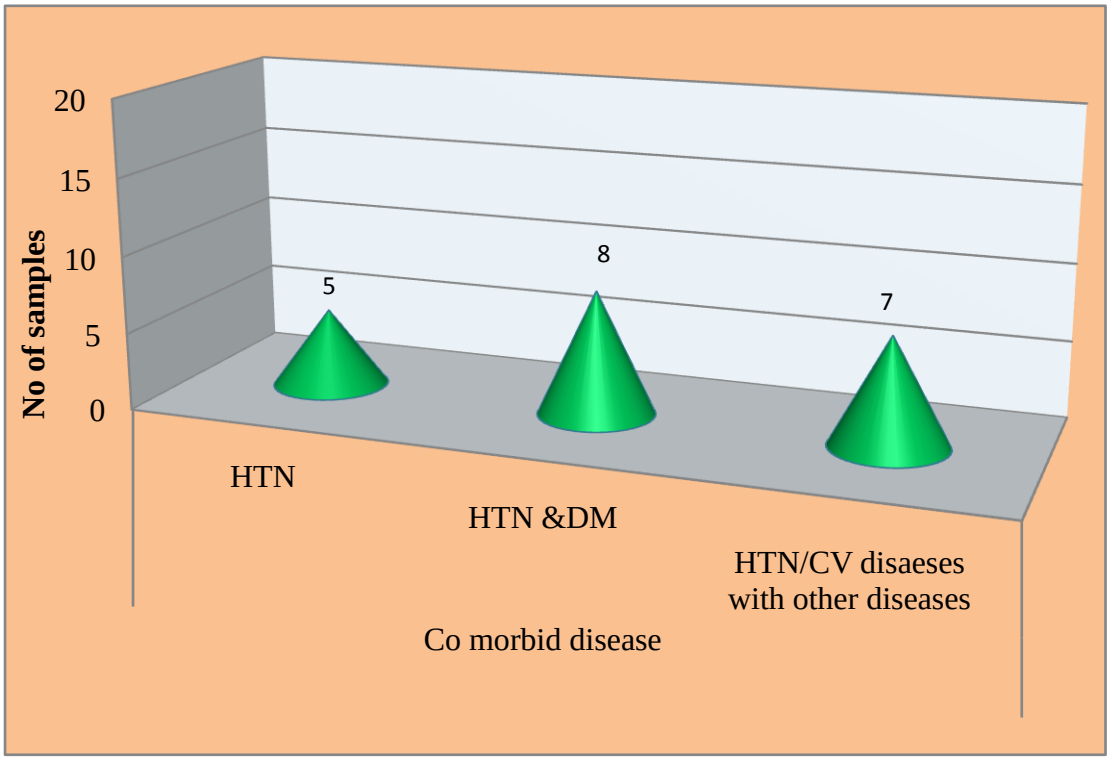


FIGURE 4.4: DISTRIBUTION OF PATIENTS UNDERGOING HEMODIALYSIS ON THE BASIS OF HEALTH STATUS

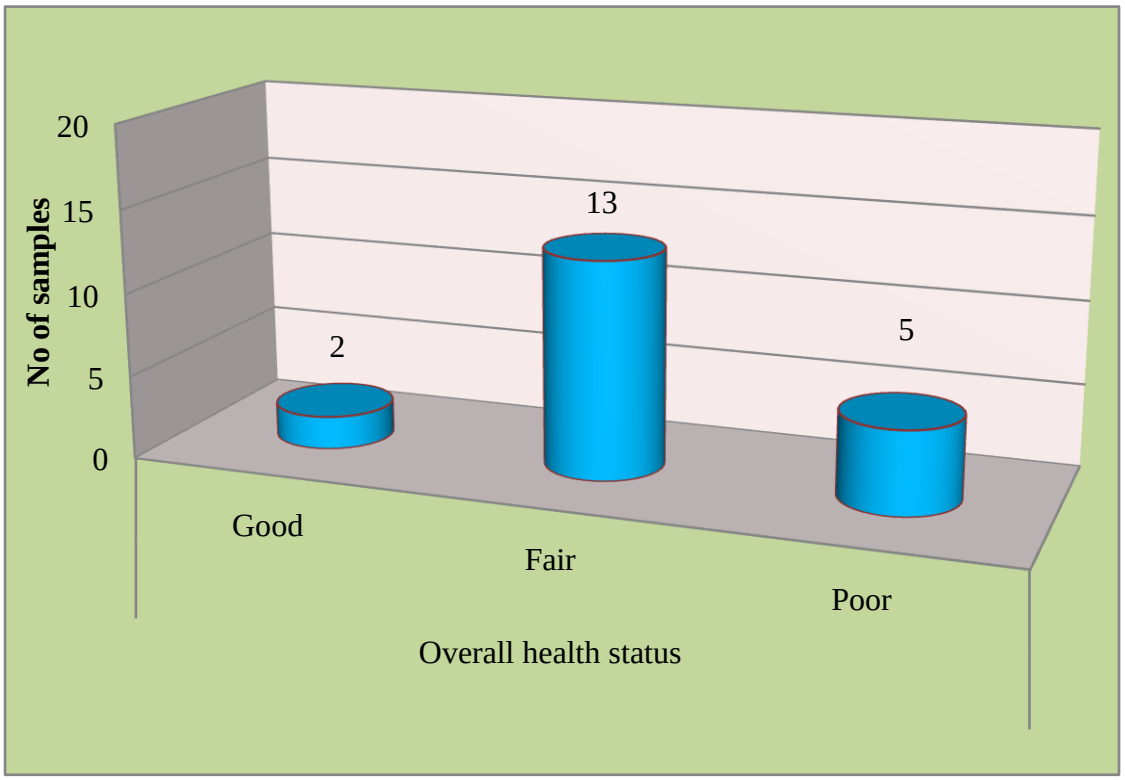


TABLE 4.2: DISTRIBUTION OF PATIENTS UNDERGOING HEMODIALYSIS ACCORDING TO PATIENT ASSESSMENT DATA

n =20

Sl no	Patient assessment		Frequency	Percentage
General assessment				
	Vital signs			
1	Temperature	a) Normal	1	5
		b) Decreased	19	95
2	Pulse	a) Normal	15	75
		b) Increased	5	25
3	Peripheral pulses	a) Feeble	17	85
		b) Normal and palpable	3	15
4	Respiration	a) Normal	13	65
		b) Increased	7	35
5	Blood pressure	a) Increased	20	100
	General appearance			
6	Body build	a) Ectomorphic	3	15
		b) Mesomorphic	16	80
		c) Endomorphic	1	5
7	Activity	a) Dull	18	90
		b) Active	2	10
	Skin			
8	Temperature	a) Warm	20	100
9	Texture	a) Dry	5	25

		b) Wrinkled	12	60
		c) Moisture	3	15
10	Turgor	a) Good	2	10
		b) Decreased	18	90
11	Pallor	a) Present	20	100
12	Lesion	a) Present	2	10
		b) Absent	18	90
13	Pigmentation	a) Present	2	10
		b) Absent	18	90
14	Edema	a) Present	18	90
		b) Absent	2	10
	Hair			
15	Color	a) Black	7	35
		b) Grey	13	65
16	Texture	a) Fair	19	95
		b) Poor	1	5
17	Hair loss	a) Present	10	50
		b) Absent	10	50
	Nails			
18	Color	a) Pink	1	5
		b) Pale	19	95
19	Pigmentation	a) Present	6	30
		b) Absent	14	70
20	Texture	a) Good	4	20

		b) Fair	16	80
21	Capillary refilling time	a) Normal	1	5
		b) Increased	19	95
System assessment				
	Respiratory system			
22	Cough	a) Present	10	50
		b) Absent	10	50
23	Breathing difficulty	a) Present	9	45
		b) Absent	11	55
	Musculoskeletal system			
24	Muscle weakness	a) Present	6	30
		b) Absent	14	70
25	Muscle tone	a) Good	16	80
		b) Poor	4	20
26	Muscle strength	a) Good	16	80
		b) Poor	4	20
	Gastrointestinal system			
27	Appetite	a) Normal	12	60
		b) Decreased	8	40
28	Nausea	a) Present	10	50
		b) Absent	10	50
29	Vomiting	a) Present	6	30
		b) Absent	14	70
30	Ascitis	a) Present	1	5

		b) Absent	19	95
31	Bowel elimination	a) Regular	15	75
		b) Constipation	5	25
	Urinary system			
32	Urine out put	a) Normal	1	5
		b) Decreased	19	95

Table 4.2 reveals the distribution of patient assessment data

Vital signs

Temperature: 19(95%) of the subjects had decreased body temperature and only 01(5%) had normal body temperature.

Pulse: Majority of subjects had normal pulse rate ie, 15 (75%) and 5 (25%) had increased rate.

Peripheral pulse: 17(85%) of subjects' peripheral pulse were feeble and 03(15%) were normal and palpable.

Respiration: Considering the respiration, 13(65%) had normal respiratory rate, 07(35%) had increased respiratory rate

Blood pressure: All subjects 20(100%) had increased blood pressure

General appearance

Body build: 16 (80%) of subjects were mesomorphic, 03(15%) were ectomorphic and 01(5%) were endomorphic

Activity: Majority 18 (90%) of subjects 'activity was dull and 2(10%) of subjects were active

Skin

Temperature: All of the subjects 20(100%) were warm.

Texture: Most of the subjects 12(60%) were wrinkled, 05(25%) had dry texture and 03(15%) skin was moisture.

Turgor: 18 (90%) subjects had decreased skin turgor and 02(10%) had good turgor.

Pallor: Paleness were present for 20(100%) all the subjects.

Lesion: Lesion were absent for 18(90%) of the subjects and 02(10%) had lesion in skin.

Pigmentation: Majority 18(90%) of subjects had no pigmentation and 02(10%) had pigmentation.

Edema: 18(90%) of subjects had edema and no edema were present for 02(10%) of the subjects

Hair

Color: Considering the hair color, 13(65%) of subjects had grey and 07(35%) had black in color.

Texture: Texture of hair were fair 19(95%) and 1(5%) were poor.

Hair loss: 10(50%) of the subjects had hair loss and hair loss were absent for 10(50%) of the subjects.

Nails

Color: Considering the color of nails, 19(95%) of subjects had pale and 01(5%) was pink in color.

Pigmentation: Pigmentation were present for 14(70%) of the subjects and were absent for 06(30%) of the subjects.

Texture: Texture of nails were fair for 16(80%) of the subjects & 4(20%) were poor.

Capillary refilling time: Regarding capillary refilling time of subjects, 19 (95%) of subjects were increased and 01(5%) were normal.

SYSTEM ASSESSMENT

Respiratory system

Cough: 10 (50%) of subjects had cough and 10(50%) were not having cough.

Breathing difficulty: 11 (55%) of subjects had no breathing difficulty and 09(45%) had breathing difficulty.

Musculoskeletal system

Muscle weakness: Majority 14(70%) of the subjects were not having muscle weakness and 06(30) had muscle weakness.

Muscle tone: Most of the subjects' 16(80%) muscle tone were good and 04(20%) were poor.

Muscle strength: Most of the subjects' 16(80%) muscle strength were good and 04(20%) were poor.

Gastrointestinal system

Appetite: 12(60%) subjects had normal appetite and 08(40%) had decreased appetite.

Nausea: 10(50%) subjects had nausea and were absent for 10(50%) of the subjects.

Vomiting: Vomiting were absent for 14(70%) of the subjects and were present for 6(30%) of the subjects.

Ascitis: 19(95%) of subjects were not having ascitis and 01(5%) had ascitis.

Bowel elimination: Bowel elimination were regular for15 (75%) of subjects and 5(25%) had constipation.

Urinary system

Urine output: 19(90%) of subjects had decreased urine output and 01(5%) had normal urine output.

TABLE 4.3: DISTRIBUTION OF PATIENTS UNDERGOING HEMODIALYSIS BASED ON NUTRITIONAL STATUS

n=20

Level of nutrition	Scores	Frequency	Percentage
Well nourished	1-20	0	0
Mild to moderately malnourished	21-60	20	100
Severely malnourished	60-80	0	0
Total	80	20	100

Table 4.3 shows the nutritional status of patients undergoing hemodialysis. All patients 20(100%) were mild to moderately malnourished

FIGURE 4.5: DISTRIBUTION OF PATIENTS BASED ON NUTRITIONAL ASSESSMENT

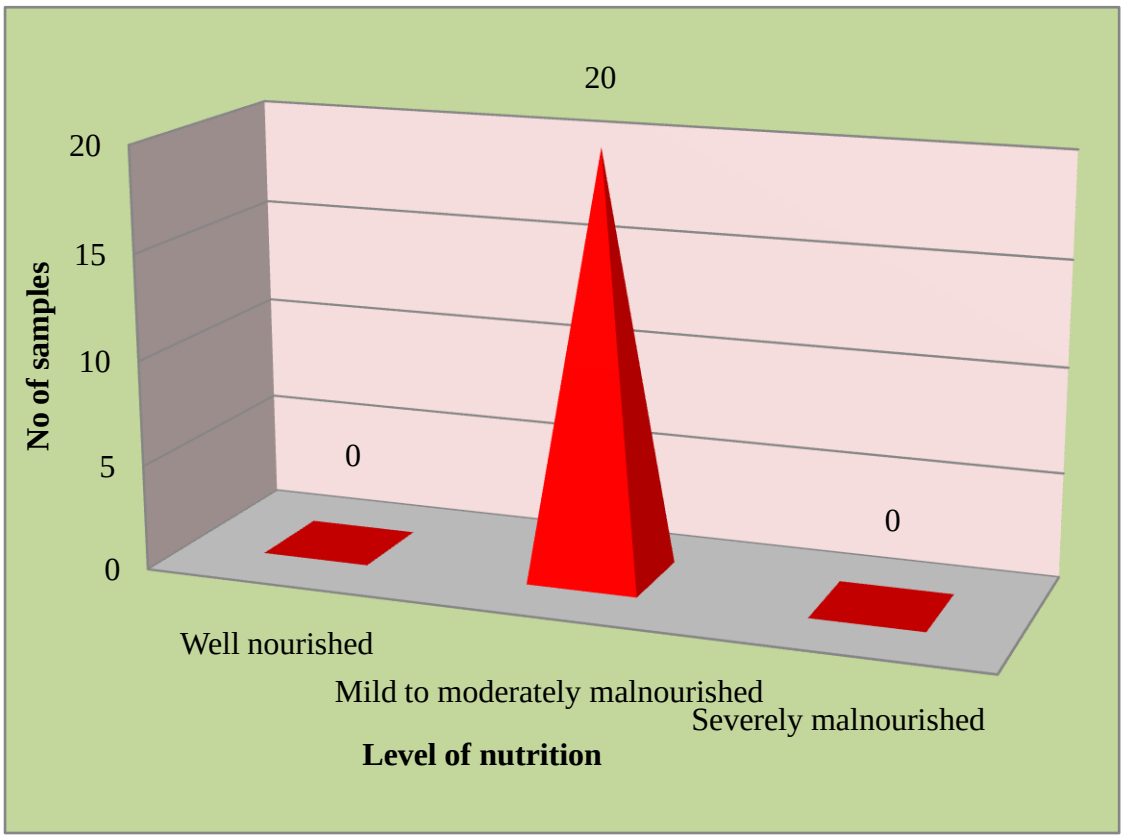


TABLE 4.4: DISTRIBUTION OF PRETEST AND POST TEST LEVEL OF KNOWLEDGE NO NUTRITION AMONG PATIENTS UNDERGOING HEMODIALYSIS

n = 20

Level of knowledge	Scores	Pre test		Post test	
		Frequency	**Percentage**	**Frequency**	**Percentage**
Adequate knowledge	19-25	0	0	17	85
Moderate knowledge	12-18	5	25	3	15
Inadequate knowledge	0-11	15	75	0	0
Total	25	20	100	20	100

Table 4.4 reveals that 5(25%) had moderate knowledge and 15(75%) had inadequate knowledge. In post test 17 (85%) had adequate knowledge and 3(15%) had moderate knowledge on nutrition.

FIGURE 4.6: DISTRIBUTION OF PRETEST AND POST TEST LEVEL OF KNOWLEDGE IN NUTRITION AMONG PATIENTS UNDERGOING HEMODIALYSIS.

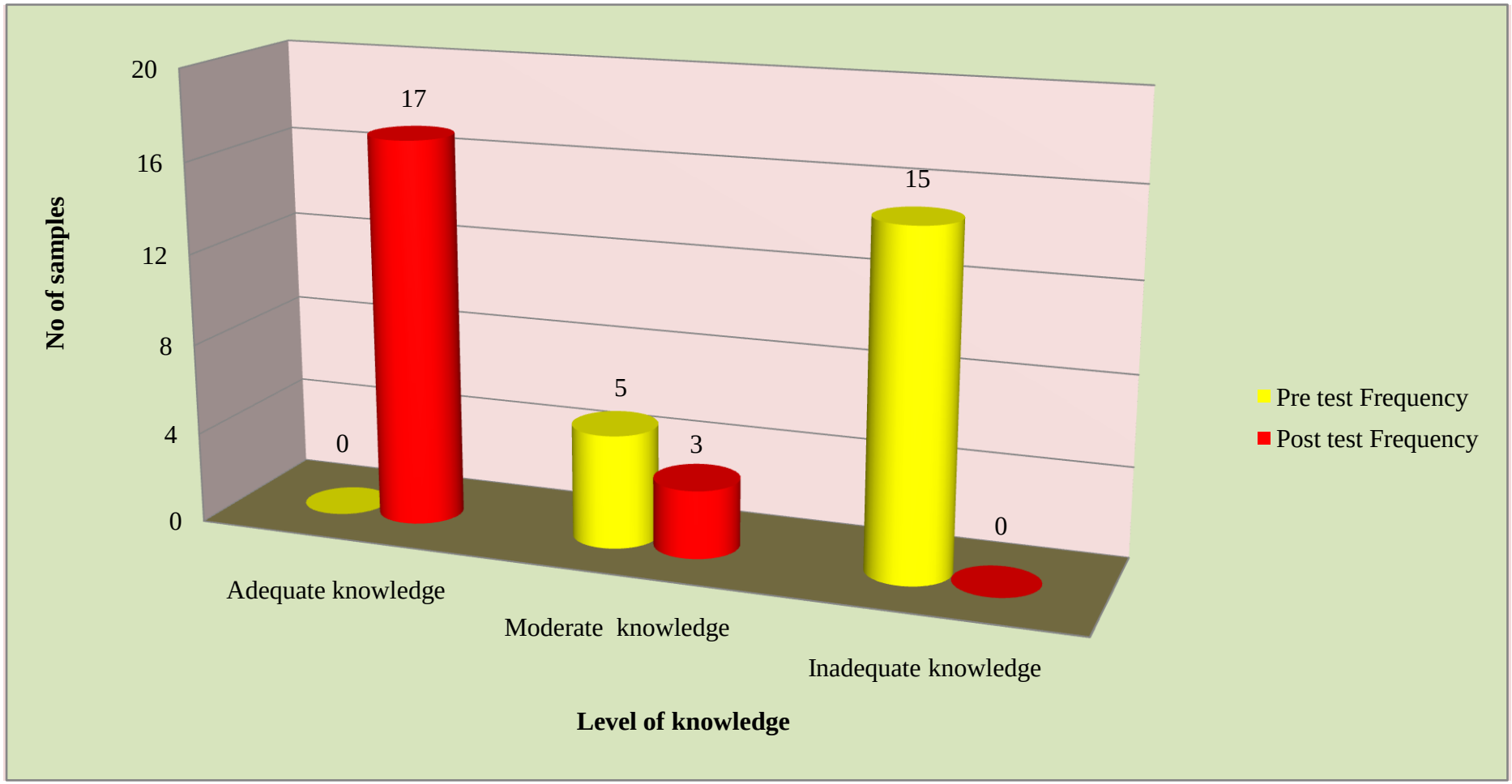


TABLE 4.5: COMPARISON OF PRETEST AND POST TEST LEVEL OF KNOWLEDGE ON NUTRITION AMONG PATIENTS UNDERGOING HEMODIALYSIS

n = 20

Assessment phase	Knowledge Scores		Mean difference	Paired 't' test	df	Table value (1%)	Significant/ Not significant
	Mean	Standard deviation					
Pre test	7.750	8.26	14.55	15.50	19	2.86	**S***
Post test	22.30	21.76					

*** Significant**

Table 4.5 shows that the mean level of pretest knowledge on nutrition among patients undergoing hemodialysis patient was 7.750 (SD= 8.26) and in the post test it was 22.30 (SD= 21.76). The computed paired't' test value (15.50) is higher than the table value (2.86) at 0.01 level of significance with 19 degrees of freedom. Therefore, there was a significant difference between pretest and post test level of knowledge on nutrition among hemodialysis.

TABLE 4.6:- ASSOCIATION BETWEEN PRETEST KNOWLEDGE SCORES ON NUTRITION AND SELECTED DEMOGRAPHIC VARIABLES OF PATIENTS UNDERGOING HEMODIALYSIS

n=20

Demographic variables	Level of knowledge			Chi-square value	Table value (5%)
	Adequate knowledge	Moderate knowledge	Inadequate knowledge		
Age (Years)					
a) 1-50	0	1	6	$\chi^2 = 3.865$ df=3	7.82 NS**
b) 51- 60	0	0	7		
c) 61-70	0	2	3		
d) Above 71	0	0	1		
Sex					
a) Male	0	2	13	$\chi^2 = 0.131$ df=1	3.84 NS**
b) Female	0	1	4		
Religion					
a) Hindu	0	3	16	$\chi^2 = 0.185$ df=1	3.84 NS**
c) Muslim	0	0	1		
Education					
a) School level.	0	1	11	$\chi^2 = 12.810$ df=2	5.99 S*
b) Under graduate	0	0	6		

c) Post graduate	0	2	0		
Occupation					
a) Unemployed	0	2	3	$\chi^2 = 3.397$ df=2	5.99 NS**
b) Self employed	0	0	3		
c) Retired	0	1	11		
Marital status					
a) Married	0	2	15	$\chi^2 = 0.930$ df=1	3.84 NS**
b) Unmarried	0	1	2		
Income					
a) Rs-10,000/-	0	1	3	$\chi^2 = 0.523$ df=2	5.99 NS**
b) RS-10,001-20,000/-	0	2	13		
c) Rs- 20,001-30,000/-	0	0	1		

NS** – Not Significant S*-- Significant

Table 4.6 depicts the significance of association of pretest knowledge scores on nutrition with demographic variables. It shows that the calculated chi square value of education is significant at 0.05 level of significance. Therefore, there is an association between pretest knowledge scores and education. It also shows that the calculated value is not significant for other variables, at 0.05 level of significance. Therefore, there is no association between the pretest knowledge scores and demographic variables such as age, sex, religion, occupation, marital status and occupation.

CHAPTER - V

RESULTS AND DISCUSSION

The purpose of the study is to assess the effectiveness of individualized nutritional educational program among patients undergoing hemodialysis. The findings of the study have been discussed with reference to objectives mentioned in chapter I.

1) To assess the nutritional status of patient undergoing hemodialysis.

Table 4.3 shows the nutritional status of patients undergoing hemodialysis. All 20 patients ie (100%) were mild to moderately malnourished as per the nutritional status classification.

Tabibi, H., et al (2008) conducted a cross sectional study to determine the nutritional status of the hemodialysis patients. The study results showed 60.5% of mild to moderate and 1.5% of severe protein energy malnutrition in patients on hemodialysis.

Al-Saedy, A.J., et al (2011) conducted a study to assess the different aspects of hemodialysis including the population on dialysis, duration, co morbidities and nutritional status. The study results showed that malnutrition was present in 63.5% of patients with no significant sex difference.

Thaise, Glucia, Coimbra, de Oliveria., et al (2011) conducted a study to assess the level of nutrition on patients undergoing hemodialysis at dialysis centers in Brazil. The study results showed that malnutrition was significantly prevalent (19.5%) among patients undergoing hemodialysis.

The findings of the present study are in agreement with the above cited studies which emphasize the importance of assessing nutritional status among patients undergoing hemodialysis in reducing the morbidity and mortality risk among these patients.

2) **To provide the individualized nutritional education among patients undergoing hemodialysis.**

Individual nutritional education was provided to all 20 patients after assessing their nutritional status and pretest and post test knowledge on nutrition were assessed before and after the individualized nutritional education.

3) **To compare the pretest and post test knowledge scores regarding nutrition among patients undergoing hemodialysis**

Table 4.5 shows the level of pretest knowledge on nutrition among hemodialysis patient was 7.75 (SD= 8.26) and in the post test it was 22.30 (SD= 21.76). The computed paired 't' value (15.50) reveals that it is higher than the table value (2.86) at 0.01 level of significance. Therefore, there is a significant difference between pretest and post test level of knowledge on nutrition among hemodialysis.

As it was hypothesized, effect of the intervention was related to a significant increase in knowledge on nutrition among patients who received individualized nutritional education.

Nader, Aghakhani., et al (2012) conducted a comparative study to assess the effectiveness of education on nutrition in patients on hemodialysis. Among 70 maintenance hemodialysis patients, 35 patients received dietary counseling and rest acted as controls. The result showed that score was higher in the group who received counseling. This study concluded that one of the methods for improving quality of life in hemodialysis is education on nutrition.

L. Fathima. (2004) conducted a pre-experimental study to assess the effectiveness of information booklet provided to care givers of patients undergoing hemodialysis on knowledge of home care management. Through non probability sampling technique 30 samples were selected from Vijaya dialysis unit, Chennai. The findings of the suggested that the knowledge on home care management was increase in patients.

Thus the above cited studies support the present study and which emphasize the effectiveness of nutritional education program to improve the knowledge on nutrition among patients undergoing hemodialysis.

4) **To find the association between selected pre test knowledge scores on nutrition with selected demographic variables of patients undergoing hemodialysis**

Table 4.6 depicts the significance of association of pretest knowledge scores on nutrition with demographic variables. It shows that the calculated chi square value of education is significant at 0.05 level of significance. Therefore, there is an association between education and pretest level of knowledge. It also shows that the calculated value is not significant for other variables, at 0.05 level of significance. Therefore, there is no significant association between the pretest knowledge scores and demographic variables such as age, sex, religion, occupation, marital status and occupation.

Kirsten, L, Johansen., et al. (2003) conducted a cross sectional study to aseess association between demographic variables and knowledge of patients on hemodialysis in aspects of age, education , economic status. The result shows that there is mild association between demographic variables and knowledge among hemodialysis patients

In the view of above study and compare the present study shows there is an association between the pretest knowledge scores and demographic variables.

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

This chapter deals with the summary of the study. Based on the summary, the implications, recommendations and limitations are highlighted.

SUMMARY

An extensive review of literature and guidance of experts lead the researcher to design the methodology. The conceptual framework adopted for this study was interaction process model of Imogene King, which is a comprehensive framework for achieving the objectives of the study.

A pre experimental, pre test post test research design was adopted for the study. Twenty samples that had fulfilled the inclusion criteria were selected for the study using convenient sampling technique. A pilot study was conducted for two weeks to assess the reliability and feasibility of the tool. After pilot study, the reliability was checked using Spearman's split half method.

During the first visit of data collection all subjects were interviewed using the structured interview guide, assessed for their level of nutritional status using modified dialysis malnutrition score and level of knowledge on nutritional education was assessed using structured interview questionnaire. The individualized nutritional education was provided to patients undergoing hemodialysis and the posttest was performed during the fourth visit.

The findings of the study showed that individualized nutritional education was effective in increasing the knowledge on nutrition among patients undergoing hemodialysis and also a significant association between pretest knowledge scores on nutrition and education among patients undergoing hemodialysis.

CONCLUSION

The findings of the study proved that patients undergoing hemodialysis had mild to moderate malnutrition and individualized nutritional education was effective in increasing the knowledge on nutrition among patients undergoing hemodialysis.

The acceptability of individualized nutritional education was supported by analysis of the subjective feelings of the study participants.

NURSING IMPLICATIONS

Nursing has now bloomed as a profession and we ought to implement our knowledge and experience in all the spheres of the profession such as Nursing service, education, research and administration; which paves the way for better future of Nursing as a profession and Nurses as professionals

Nursing Practice

As holistic care is a prime important nursing responsibility, a nurse should realize the importance of adequate screening for malnutrition and the responsibility to provide an individualized support and education to patients undergoing hemodialysis, so that improving the quality of life and decreasing complications in patients. The importance of multidisciplinary team cooperation in patient education has been noted, while the role of nurses in patient education cannot be overlooked

- Regular nutritional status assessment in hemodialysis patient is important and can be made as a part of nursing assessment for early detection of malnutrition among patients undergoing hemodialysis.

- Nutritional education can be made as an integral part of nursing care to promote quality life and decrease complications among patients undergoing hemodialysis.
- Nurses can effectively incorporate individualized nutritional counseling on the basis of nutritional assessment.

Nursing Education

The findings of the present study is having implications in nursing education

- The student Nurses must realize that nutrition is a major concern and should be able to assess nutritional status among patients undergoing hemodialysis using different assessment scales.

- Provide clinical exposure to subjective and objective assessment of nutritional status.
- Encourage student nurses' participation in workshops, which demonstrates screening for malnutrition in patients undergoing hemodialysis.
- Nursing educators should make available literature related to hemodialysis and nutrition in the library for students' reference.
- Nursing curriculum activities should focus on training for nursing students in creation of health teaching videos.
- The nurse educator should arrange continued nursing education for the staff nurses by regularly updating their knowledge on the aspect of nutrition

Nursing Administration

The findings of the present study will help nurse administrators to organize and plan for various programs to provide support and educate the patients on various aspects of nutrition.

- Create protocols for nurses to apply in practice the use of patients' nutritional assessment tools, nutritional education protocols periodically among patients undergoing hemodialysis in dialysis units.

- Findings from nursing studies of other countries can be incorporated to the patient care in relation to the nutritional education interventions form a cross-cultural perspective.

- Nurse administrator should implement outreach programs to create awareness among the public about the importance of nutrition in hemodialysis.

Nursing Research

The present study is an attempt to assess the effectiveness of individualized nutritional education among patients undergoing hemodialysis.

- Nursing research on individualized nutritional education will be a valuable reference material for further researchers.
- Evidenced based nursing practice needs to be emphasizes in this area

- Qualitative study can be undertaken to assess the self-report of the participants.

RECOMMENDATIONS

This study recommends the following for further research

- Similar studies can be undertaken in different settings.
- A similar study can be done among patients undergoing peritoneal dialysis.
- A comparative study can be done to compare the nutritional status among patients undergoing peritoneal and hemodialysis

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APPENDIX – A

PERMISSION TO CONDUCT THE STUDY

Mrs.Soumya. N, II year M.Sc Nursing Student conducted a study on**"A Study to Assess the Effectiveness of Individualized Nutritional Education among Patients Undergoing Hemodialysis in GKNM Hospital, Coimbatore"** with the approval of the ethical committee during the academic year of 2013 – 2014 in GKNM Hospital, Coimbatore. This is the partial fulfillment of the requirement for award of the degree in Master of Science, Branch-I, Medical Surgical Nursing, subspecialty-Cardiovascular and Thoracic Nursing, by the Tamilnadu Dr. MGR Medical University.

Dr. RamkumarRaghupathy, M.S., M.Ch.,FIAPS., MBA.,
DEAN

APPENDIX – B

LIST OF EXPERTS

Dr. P. Ramachandran., M.D.,
Head of Department of Nephrology,
G. Kuppuswamy Naidu Memorial Hospital,
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Dr.S.Gowtham., M.D.,
Consultant,
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Dr.S.MADHAVI, Ph.D (N).,
Principal,
KMCH College of Nursing,
Coimbatore-641014.

Prof. RAJI,MS.c (N), Ph.D (N).,
HOD, Department of Medical and Nursing,
KG College of Nursing,
Coimbatore- 641 018.

Prof. TAMILSELVI, M.Sc (N).,
HOD, Department of Medical and Nursing,
PSG College of Nursing,
Coimbatore- 641 004.

APPENDIX -- C1

DATA COLLECTION TOOL IN ENGLISH

Please give appropriate information to the following questions asked. The information obtained will be kept confidential and is used for the intended work.

SECTION A- STRUCTURED INTERVIEW GUIDE

Sample No:…….

Part A -Baseline Data

Demographic data

1. Age in years :

   a) ≤ 40 ☐
   b) 41-50 ☐
   c) 51-60 ☐
   d) 61-70 ☐
   e) ≥ 71 ☐

2. Sex:

   a) Male ☐
   b) Female ☐

3. Religion:

   a) Hindu ☐
   b) Muslim ☐
   c) Christian ☐

4. Education:

   a) Illiterate ☐
   b) School level ☐

c) Undergraduate ☐

d) Postgraduate ☐

5. Occupation:

a) Unemployed ☐

b) Self employed ☐

c) Government Employee ☐

d) Private Employee ☐

6. Monthly Income:

a) Rs ≤ 10,000 ☐

b) Rs 10,001 – 20,000 ☐

c) Rs 20,001 - 30,000 ☐

d) Rs ≥ 30,001 ☐

7. Marital status

a) Unmarried ☐

b) Married ☐

c) Widow / widower ☐

Patient Data

1. Diagnosis:
2. Type of kidney: own / transplanted
3. Co morbid diseases:
4. Current medications:
5. Overall patient health status :

   Hemodialysis details
6. Type of access: AV fistula / AV graft / jugular access/ subclavian access
7. Period under hemodialysis: <2 yrs / 2-5 yrs / >5 yrs
8. No: of sessions in a week: 2/3/4
9. Duration of each session :
10. Blood transfusion during diagnosis: yes / no

If yes when……., blood product….. reason…….

11. Intradialytic parentral nutrition therapy: yes/ no

    If yes when….. no of times….. name of the product……,

    amount of infusion……., reason…….

12. Fluid restriction prescribed:
13. Dietary pattern prescribed:
14. Patient compliance with dietary advice: yes/ no
15. Patient compliance with fluid restriction prescribed: yes / no

Part B Patient Assessment

General assessment

1. Vital signs
    - Temperature:
    - Pulse:
    - Peripheral pulses:
    - Respiration:
    - Blood pressure:
2. General appearance
    - Body build:
3. Activity:
4. Skin
    - Temperature:
    - Texture:
    - Turgor:
    - Pallor:
    - Lesion:
    - Pigmentation:
    - Edema:

5. Hair
    - Color:
    - Texture:

- Hair loss:

6. Nails
    - Color:
    - Pigmentation:
    - Texture:
    - Capillary refilling time:

System assessment:

7. Musculoskeletal assessment
    - Muscle weakness
    - Muscle tone
    - Muscle strength
8. Gastro intestinal system
    - Appetite:
    - Nausea (frequency):
    - Vomiting (frequency):
    - Ascitis
    - Bowel elimination
9. Urinary system
    - Urine output:

SECTION B - NUTRITIONAL ASSESSMENT

Part-A : General Nutritional Assessment

1. Height:
2. Weight
    a. Current weight
    b. Dry weight
    c. Weight before 3 months
3. Mid arm circumference:
4. Mid arm muscle circumference
5. Body mass index:
6. Ideal body weight:
7. Body fat percentage
8. 24 hours dietary recall

Sl no	Food item	Amount	Carbohydrate	Protein	Fat

Part B : Modified Dialysis Malnutrition Score (Measurement scale)

(A) Patients related medical history:				
1- Weight change (overall change in past 3 months)				
1	2	3	4	5
No weight change or gain	Minor weight loss (<5%)	Weight loss 5 to 10%	Weight loss 10 to 15%	Weight loss (>15%)
2- Dietary intake (type of diet)				
1	2	3	4	5
No change	Sub optimal solid diet	Full liquid diet	Hypo caloric liquid diet	Starvation
3- Gastrointestinal symptoms (related to nutrition)				
1	2	3	4	5
No symptoms	Nausea	Vomiting or moderate GI symptoms	Diarrhea	Severe anorexia
4- Respiratory symptoms (related to nutrition)				
1	2	3	4	5
No symptoms	Cough	Wheezing or shortness of breath	Coughing up blood or crowing sound while breathing	Pneumonia
5- Functional capacity (nutritionally related functional impairment)				

1	2	3	4	5
None	Difficulty with ambulation	Difficulty with normal activity	Light activity	Bed / chair-ridden with no or little activity
6- Co-morbidity (presence of 1-2 diseases)				
1	2	3	4	5
Dialysis <12 months and other wise	Dialysis 1-2 yrs or mild co-morbidity	Dialysis 2-4yrs or age >75 or moderate co-morbidity	Dialysis >4 yrs or severe co-morbidity	Very severe multiple co-morbidity
B. Physical examination				
1- Decreased fat stores or loss of subcutaneous fat (below eyes, triceps, biceps, chest)				
1	2	3	4	5
No change		Moderate		Severe
2- Signs of muscle wasting				
1	2	3	4	5
No change		Moderate		Severe
3- Body mass index: BMI = Wt(kg)/ Ht(m2)				
1	2	3	4	5
BMI≥20 kg/m^2	18-19.99 kg/m^2	16-17.99 kg/m^2	15-15.99 kg/m^2	<15kg/m^2

4- Percentile ideal body weight: % IBW = (current weight/IBW)×100				
1	2	3	4	5
100-90%	80-89%	70-79%	60-69%	<60
D. Laboratory parameters:				
1- Serum albumin				
1	2	3	4	5
≥4.0g/dl		3-3.9g/dl		<3.0g/dl
2- Serum urea				
1	2	3	4	5
10- 30mg/dl		30-100mg/dl		<100mg/dl
3- Serum creatinine				
1	2	3	4	5
0.7-1.3mg/dl-male 0.6-1.1mg/dl-F				<0.7 mg/dl-M <0.6mg/dl-F
4- Hemoglobin				
1	2	3	4	5
14-18gm/dl-M 12-16gm/dl-F	14-11mg/dl- M 12-11mg/dl- F	9.5-11 both M & F	8-9.5	Below 8

5- Random Blood Glucose				
1	2	3	4	5
70-140mg/dl		140-200g/dl		<200g/dl
6-Serum Potassium				
1	2	3	4	5
3.5-5.5mlEq/l		2.5-3.5 and 5.5-6 mlEq/l		<2.5 and>6 mlEq/l

SCORING AND INTERPRETATION

Level of nutritional status

Level of nutritional status	**Score**	**Percentage**
Well nourished	1-20	<25%
Mild to moderately malnourished	20-60	25-75%
Severely malnourished	60-80	>75%

SECTION C

STRUCTURED INTERVIEW QUESTIONNAIRE

Instructions:-

- Kindly answer all the questions
- Each question has 4 alternatives
- Please understand each question and respond for each.

1. What do you understand by hemodialysis?
    a) Removal of salt from blood ☐
    b) Withdrawing of blood ☐
    c) Removal of waste and excess water from blood ☐
    d) Administration of blood ☐

2. What do you understand by the term nutrients?
    a) Components in the food that provides nutrition ☐
    b) Substance present in drinks. ☐
    c) To maintain the energy level ☐
    d) Constituents of bones and joints ☐

3. Why nutrition is important for hemodialysis patients?
    a) To limit the waste products accumulation ☐
    b) To replace nutrient losses associated with dialysis. ☐
    c) To maintain the energy level. ☐
    d) All the above ☐

4. How much energy (kilocalories) of food can be taken by a hemodialysis patient?
    a) Less than 30K Cal/ body wt / day ☐
    b) 30 -35 Kcal/body wt/day ☐
    c) More than 35Kcal/body wt/ day ☐
    d) Unlimited ☐

5. Which of the following is foremost in providing more energy for the body?
    a) Carbohydrates ☐
    b) Vitamins ☐
    c) Minerals ☐
    d) Water ☐

6. A person undergoing hemodialysis should consume diet high in ----------
    a) Carbohydrates ☐
    b) Fats ☐
    c) Protein ☐
    d) Vitamins ☐

7. Which among the following is a high quality protein food?
    a) Egg white ☐
    b) Peas ☐
    c) Beans ☐
    d) Potato ☐

8. Which among the following contains low quality protein?
    a) Soybean ☐
    b) Chicken ☐
    c) Fish ☐
    d) Dried vegetables and nuts ☐

9. Why should a hemodialysis patient limit low quality protein?
    a) Increases thirst ☐
    b) Decreases appetite ☐
    c) Increases potassium ☐
    d) Reduces energy ☐

10. Which of the following fat can be consumed by a hemodialysis person? ☐
    a) Coconut oil

b) Ghee ☐
c) Sunflower oil ☐
d) Butter ☐

11. Why unsaturated fat (liquid at room temperature) are better for a hemodialysis person?
    a) Easily digestible ☐
    b) Cheaper to buy ☐
    c) Heart healthy ☐
    d) Easily removed by dialysis ☐

12. Which of the following is a solid fat that has to be avoided by hemodialysis patient?
    a) Ground nut oil ☐
    b) Butter ☐
    c) Olive oil ☐
    d) Sunflower oil ☐

13. Which of the following is the high phosphorous food that should be avoided?
    a) Dried vegetables and fruits ☐
    b) Tea and coffee ☐
    c) Boiled vegetables ☐
    d) Fish ☐

14. When should phosphate binders be taken?
    a) 30 minutes before food ☐
    b) With food ☐
    c) 15 minutes before food ☐
    d) After food ☐

15. Which of the iron rich food that can be taken by hemodialysis patient?
    a) Guava ☐
    b) Soybean ☐

c) Dates ☐

d) Groundnut ☐

16. Which of the dietary mineral must be limited for a hemodialysis patient?

a) Potassium ☐

b) Zinc ☐

c) Iron ☐

d) calcium ☐

17. Which one of following cooking method can reduce the potassium content of your food?

a) Leaching ☐

b) Steaming ☐

c) Toasting ☐

d) Boiling ☐

18. When on hemodialysis, too much potassium in diet can cause …….

a) Loosing of teeth ☐

b) Stopping of heart ☐

c) Bone damage ☐

d) Blindness ☐

19. How much sodium per day can be taken by a hemodialysis patient? ☐

a) More than 4 grams ☐

b) 2-3 grams ☐

c) Less than 2 grams ☐

d) None

20. What happens when you eat more / excess salt? ☐

a) Increases urine output ☐

b) Increases food intake ☐

c) Increases thirst and blood pressure ☐

d) Increases energy level

21. Which of the following is an alternative for salt or sodium intake in diet?

a) Table salt ☐
b) Salt substitutes ☐
c) Herbs or spices (e.g.: pepper, lemon) ☐
d) Container foods ☐

22. Which of the following is considered as fluids?

a) Water ☐
b) Tea and juices ☐
c) Gravy and rasam ☐
d) All the above ☐

23. What are the measures that can be taken to restrict excessive fluid intake?

a) Use measuring cups ☐
b) Takes sips of water ☐
c) Stay out of heat ☐
d) All the above ☐

24. What happens when you drink more fluids?

a) Increases urine output ☐
b) Results in edema ☐
c) Increases sweating ☐
d) Increases thirst ☐

25. Weight gain along with slight difficulty in breathing indicates…..

a) Good health ☐
b) Adequate nutrition ☐
c) Fluid accumulation ☐
d) Effective treatment ☐

ANSWER KEY

Scoring procedure

Each correct response gets a score of one (1) there are 25 items and hence the maximum score of the knowledge questions is 25.

Q. No:	Answer	Q. No:	Answer
1.	c.	14.	b.
2.	d.	15.	b.
3.	a.	16.	a.
4.	b.	17.	a.
5.	a.	18.	b.
6.	c.	19.	b.
7.	a.	20.	c.
8.	d.	21.	c.
9.	c.	22.	d.
10.	c.	23.	d.
11.	c.	24.	b.
12.	b.	25.	c.
13	a.		

SCORING AND INTERPRETATION

Level of knowledge

Level of knowledge	Score	Percentage
Adequate knowledge	19-25	>75%
Moderate knowledge	12-18	75-50%
Inadequate knowledge	0-11	<50%
Maximum	25	100%

APPENDIX -- C2

DATA COLLECTION TOOL IN TAMIL

பகுதி - இ

வடிவமைக்கப்பட்ட வினாத்தாள்

1.ஹீமோடயாலிசிஸை குறித்து நீங்கள் என்ன புரிந்து கொண்டீர்கள்?

அ) இரத்தத்திலிருந்து உப்புச்சத்தை நீக்குதல்

ஆ) இரத்தத்தை உடம்பிலிருந்து வெளியேற்றுதல்

இ) உடம்பிலிருந்து கழிவுப் பொருள் மற்றும் தேவையற்ற நீரை வெளியேற்றுதல்.

ஈ) இரத்தத்தை உட்செலுத்துதல்.

2. ஊட்டச்சத்து என்ற வார்த்தையின் மூலம் என்ன புரிந்து கொண்டீர்கள்?

அ) ஊட்டச்சத்தை கொடுக்கும் உணவுப் பொருட்கள்.

ஆ) நீரில் அடங்கியுள்ள பொருள்

இ) குடிபானத்தில் அடங்கியுள்ள பொருள்

ஈ) எலும்பு மற்றும் மூட்டுகளில் உள்ள பொருள்

3. ஏன் ஹீமோடாயாலிசிஸ் நோயாளிகளுக்கு ஊட்டச்சத்து மிக அவசியமானது?

அ) கழிவுப் பொருட்கள் தேங்குவதை கட்டுப்பாட்டிற்குள் வைப்பதற்கு

ஆ) டாயாலிசிஸினால் உண்டான ஊட்டச்சத்து இழப்பை சரிசெய்து பழைய நிலைக்கு கொண்டு வருவதற்கு

இ) உடலின் சக்தி நிலையை தொடர்ந்து செயலாற்றுவதற்கு

ஈ) மேலே கூறிய அனைத்தும்

4. ஹீமோடயாலிசிஸ் நோயாளி ஒரு நாளைக்கு எவ்வளவு சக்தியுள்ள உணவுப் பொருட்களை எடுத்துக் கொள்ள வேண்டும்?

அ) 30 கிலோ கலோரி / உடல் எடை / நாளுக்கும் குறைவாக

ஆ) 30 – 35 கிலோ கலோரி / உடல் எடை / நாள்

இ) 35 கிலோ கலோரி / உடல் எடை / நாளுக்கும் அதிகமாக

ஈ) கட்டுப்பாடற்ற உணவு முறை

5. கிழே கொடுக்கப்பட்டுள்ளவைகளில் எவை உடலுக்கு அதிகமான சத்தியை அளிக்கிறது?

அ) கார்போ ஹைட்ரேட்

ஆ) வைட்டமின்கள்

இ) தாது பொருட்கள்

ஈ) நீர்

6. ஹீமோடயாலிசிஸ் செய்து கொண்டிருக்கும் நபர் அதிகமாக எடுக்க வேண்டிய சத்து எது?

அ) கார்போ ஹைட்ரேட்

ஆ) கொழுப்புச் சத்து

இ) புரதச்சத்து

ஈ) வைட்டமின்கள்

7. கீழே கொடுக்கப்பட்டுள்ளவைகளில் அதிக தரமான புரதச்சத்து உள்ள உணவுப் பொருள் எது?

அ) முட்டையின் வெள்ளைக் கரு

ஆ) பட்டாணி

இ) பீன்ஸ்

ஈ) உருளைக்கிழங்கு

8. கீழே கொடுக்கப்பட்டுள்ளவைகளில் குறைவான தரமுள்ள உணவுப் பொருள் எது?

அ) சோயா பீன்ஸ்

ஆ) கோழிக்கறி

இ) மீன்

ஈ) உலர்ந்த காய்கறிகள் மற்றும் பருப்பு வகைகள்

9. ஏன் ஹீமோடயாலிசிஸ் நோயாளி குறைந்த தரமுள்ள புரதச்சத்தை அளவாக எடுக்க வேண்டும்?

அ) தாகத்தை அதிகரிப்பதற்கு

ஆ) பசியுணர்வை குறைப்பதற்கு

இ) பொட்டாசியத்தின் அளவை அதிகரிப்பதற்கு

ஈ) உடலில் சக்தியின் அளவை குறைப்பதற்கு

10. கீழே கொடுக்கப்பட்டுள்ளவைகளில் எந்த கொழுப்புச் சத்து நிறைந்த உணவுப் பொருளை ஹீமோடயாலிசிஸ் நோயாளி உட்கொள்ள வேண்டும்?

அ) தேங்காய் எண்ணெய்

ஆ) நெய்

இ) சூரியகாந்தி எண்ணெய்

ஈ) வெண்ணெய்

11. ஏன் தேயாத கொழுப்பு பொருள் (அறையின் வெப்பநிலையில் திரவமாய் இருக்கும்) ஹீமோடயாலிசிஸ் நோயாளிகளுக்கு நல்லது?

அ) எளிமையான செரிமான தன்மையுடையது

ஆ) குறைந்த விலையில் கிடைக்கக் கூடியது

இ) இதயத்திற்கு நல்லது

ஈ) டயாலிசிஸின் மூலமாக எளிதில் நீக்கக்கூடியது

12. கீழே கொடுக்கப்பட்டுள்ளவைகளில் எந்த திட கொழுப்புச்சத்து உள்ள உணவுப் பொருளை ஹீமோடயாலிசிஸ் நோயாளி தவிர்க்க வேண்டும்?

அ) நிலக்கடலை எண்ணெய்

ஆ) வெண்ணெய்

இ) ஆலிவ் எண்ணெய்

ஈ) சூரிய காந்தி எண்ணெய்

13. கீழே கொடுக்கப்பட்டுள்ளவைகளில் பாஸ்பரஸ் அதிகம் நிறைந்துள்ள எந்த உணவுப் பொருளை தவிர்க்க வேண்டும்?

அ) உலர்ந்த காய்கறிகள் மற்றும் பழங்கள்

ஆ) தேநீர் மற்றும் காபி

இ) வேக வைத்த காய்கறிகள்

ஈ) மீன்

14. எப்பொழுது பாஸ்பேட்டை இணைக்கும் பொருட்களை எடுக்க வேண்டும்?

அ) சாப்பிடுவதற்கு 30 நிமிடங்களுக்கு முன்பு

ஆ) உணவுடன்

இ) சாப்பிடுவதற்கு 15 நிமிடத்திற்கு முன்பு

ஈ) உணவிற்குப் பின்

15. இரும்புச்சத்து நிறைந்தள்ள எந்த உணவுப் பொருளை ஹீமோடயாலிசிஸ் நோயாளி உட்கொள்ள வேண்டும்?

அ) கொய்யாப்பழம்

ஆ) சோயா பீன்ஸ்

இ) பேரிச்சை பழம்

ஈ) நிலக்கடலை

16. ஹீமோடயாலிசிஸ் நோயாளி எந்த தாதுப் பொருள் நிறைந்த உணவை அளவாக உட்கொள்ள வேண்டும்?

அ) பொட்டாசியம்

ஆ) ஜிங்க்

இ) இரும்புச்சத்து

ஈ) கால்சியம்

17. கீழே கொடுக்கப்பட்டுள்ளவைகளில் எந்த உணவு சமைக்கும் முறை உங்களது உணவிலுள்ள பொட்டாசியத்தின் அளவை குறைக்கிறது?

அ) ஊறவைத்து சமைத்தல்

ஆ) நீராவியில் வேக வைத்தல்

இ) சுட்டெடுத்தல்

ஈ) வேக வைத்து சமைத்தல்

18.ஹீமோடயாலிசிஸ் செய்யும் நாட்களில் அதிக அளவு பொட்டாசியம் நிறைந்த உணவுப் பொருள்----------யை விளைவிக்கும்

அ) பற்களை இழத்தல்

ஆ) இதய செயல்பாடு நின்று போதல்

இ) எலும்புகள் சேதமடைதல்

ஈ) கண் பார்வை இழத்தல

19.ஹீமோடயாலிசிஸ் நோயாளி ஒரு நாளைக்கு எவ்வளவு சோடியம் உட்கொள்ள வேண்டும்?

அ) 4 கிராமுக்கு அதிகமாக

ஆ) 2-3 கிராம்

இ) 2 கிராமுக்கு குறைவாக

ஈ) எதுவுமில்லை

20. நீங்கள் அதிக அளவு உப்பை உட்கொள்ளும் பொழுது என்ன நிகழ்கிறது?

அ) அதிக அளவு சிறுநீர் வெளியேறுதல்

ஆ) அதிக அளவு உணவு உட்கொள்ளுதல்

இ) அதிக அளவு தாகம் ஏற்படுதல் மற்றும் இரத்த அழுத்தம் அதிகரித்தல்

ஈ) உடல் வலிமை கூடுதல்

21. கீழே கொடுக்கப்பட்டுள்ளவைகளில் எவை உப்பு அல்லது சோடியத்திற்கு பதிலாக உணவில் சேர்த்துக் கொள்ளப்படுகிறது?

அ) டேபிள் சால்ட்

ஆ) உப்புக்கு பதிலாக பயன்படும் பொருள்

இ) மருந்து அல்லது மணம் தரும் பொருள் (உ.தா. குருமிளகு, எலுமிச்சை)

ஈ) அடைத்து வைக்கப்பட்ட உணவுப் பொருட்கள்

22. கீழே கொடுக்கப்பட்டுள்ளவைகளில் எவை திரவப் பொருளாக எடுத்துக் கொள்ளப்படுகிறது?

அ) நீர்

ஆ) தேநீர் மற்றும் பழச்சாறு

இ) குழம்பு மற்றும் ரசம்

ஈ) மேலே கூறிய அனைத்தும்

23. என்ன வழிமுறையை பின்பற்றுவதன் மூலம் அதிக அளவு திரவம் எடுத்துக் கொள்வதை தவிர்க்கலாம்?

அ) அளவு குறிக்கப்பட்ட கப்பை பயன்படுத்துதல்

ஆ) கொஞ்சம் கொஞ்சமாக நீர் அருந்துதல்

இ) அதிக வெப்பமான இடத்தை தவிர்த்தல்

ஈ) மேலே கூறிய அனைத்தும்

24. நீங்கள் அதிக அளவு திரவத்தை பருகும் போது என்ன நிகழ்கிறது?

அ) அதிகமாக சிறுநீர் வெளியேறுதல்

ஆ) வீக்கம் ஏற்படுதல்

இ) அதிக வியர்வை ஏற்படுதல்

ஈ) அதிகமான தாகம் ஏற்படுதல்

25. உடல் எடை கூடுவதுடன் சிறிதளவு மூச்சுத்திணறலும் ஏற்படுவது எதை குறிக்கிறது?

அ) நல்ல உடல் நிலையை

ஆ) தேவையான அளவு ஊட்டச்சத்து உள்ளதை

இ) நீர் தேக்கம் ஏற்படுவதை

ஈ) சரியான முறையில் சிகிச்சை பெறுவதை

APPENDIX – D1

INTERVENTION IN ENGLISH

INDIVIDUALIZED EDUCATION PROGRAMME

ON NUTRITION AND HEMODIALYSIS

Place : Dialysis unit of GKNM hosptial

Group : Patients undergoing hemodialysis

Method of teaching : Lecture cum Discussion

A.V aids : Power point slides, real objects

Educator : Ms. Soumya. N

INTRODUCTION

Food , It's a vital part of our culture and our family traditions. Meals are something we look forward to each day. Food is love, comfort and memories.

We all have favorite foods and things we don't like, and foods we used to eat but don't eat any more. We may love to cook or never set foot in a kitchen. But anyway we look at it; food is a big part of life.

A chronic illness like kidney failure can require changes in your eating and drinking habits. These lifestyle changes can be hard to understand and harder to make.

HEMODIALYSIS

Healthy kidneys clean your blood and remove extra fluid in the form of urine. They also make substances that keep your body healthy. Chronic kidney disease and acute renal failure cause the kidneys to lose their ability to filter and remove waste and extra fluid from the body. Dialysis replaces some of these functions when your kidneys no longer work. Hemodialysis is a process that uses a man-made membrane (dialyzer) to:

- Remove wastes, such as urea, from the blood.
- Restore the proper balance of electrolytes in the blood.
- Eliminate extra fluid from the body.

NUTRITION AND NUTRIENTS

- Nutrition or nourishment is the supply of materials - food - required by organisms and cells to stay alive.
- Nutrients are the components or chemical in food that provides nourishment.
- These nutrients can be categorized as either macronutrients (needed in relatively large amounts) or micronutrients (needed in smaller quantities).
- The macronutrients include carbohydrates (including fiber), fats, protein, and water. The micronutrients are minerals and vitamins.
- The macronutrients are the one which provides energy to our body.

If you are receiving hemodialysis treatments, your diet is an important part of your overall care. Haemodialysis is known to affect nutritional intake and the nutritional requirements of the patient and results in malnutrition.

The haemodialysis diet has several important functions:

- To limit the buildup of waste products (urea, phosphate, and potassium, fluid and salt).
- To prevent metabolic complications (e.g. renal bone disease, anorexia etc).
- To replace nutrient losses associated with the dialysis process (nitrogen, vitamins and minerals).
- To optimize/maintain nutritional status.

These guidelines include recommendations on the nutritional requirements of energy, Protein, phosphorous, potassium, fluid, sodium, vitamins and minerals in haemodialysis Patients.

ENERGY

Calories are a measure of the energy in a food. Our body is like motors that need energy to run and we use food as fuel to give us energy.

How many calories do you need in a day?

It's about 30-35Kcal/kg body weight /day

- If you are under age 60yrs; weight in kg ---------- × 35 = ---------- calories
- If you are 60yrs old or more; weight in kg ---------- × 30 = ---------- calories

Than carbohydrates and fat hemodialysis patient can take more protein to meet the caloric requirement

Tips to increase your appetite and get you the calories you need:

- Eat six meals a day instead of three larger ones
- Choose high calorie and protein rich foods, like meats, fish, soy etc.
- Cook foods in a way that adds calories (adding low saturated fat, like sunflower and olive oil)
- Eat in a calm, relaxed atmosphere. Use pretty plate or colorful garnish so food is more appealing
- Drink fluids that have calories
- Choose food that is easy to chew rather than streaky
- Do exercises to increase appetite

FATS

Our bodies need fat to produce energy, protect organs from injury, keep constant temperature, and to absorb some vitamins. People on hemodialysis are at a higher risk of heart disease. This means that choosing heart healthy fats is even more important for you.

Heart healthy fats

Fats that are liquid at room temperature (unsaturated fats) are less likely to form artery clogging plaques that can damage your heart.

Unsaturated fats are:

- Olive oil
- Walnut oil
- Sunflower oil
- Corn oil
- Cotton seed oil
- Soybean oil

PROTEIN

Getting the right amount of protein is important to your overall health. Your body needs the right amount of Protein for:

- Building muscles
- Repairing tissues
- Fighting infections.

The patient on hemodialysis should take dietary protein of **1-1.2/kg body wt/day.**

High quality or high biological value protein sources

- Beef, pork and lamb
- Chicken, turkey and other birds
- Fish and other sea foods
- Egg

- Soy

They have more essential amino acids which human cannot produce.

Low quality or low biological value protein sources

- Nuts
- Dry beans and peas
- Some grains (amaranth, buck wheat, corn meal, brown rice etc)

Hemodialysis patient has to limit the intake of low quality protein since most of these sources have more potassium which is dangerous

PHOSPHOROUS

Phosphorus is a mineral that healthy kidneys get rid of in the urine. In kidneys that are failing, phosphorus builds up in the blood and may cause many problems including muscle aches and pains, brittle, easily broken bones, calcification of the heart, skin, joints, and blood vessels. High phosphorous in blood can cause severe itching of skin.

To keep your phosphorus levels in check,consider the following tips:

1.Limit high phosphorus foods such as:

- Meats, poultry, dairy and fish (you should have 1 serving of 7-8 ounces)
- Milk and other dairy products like cheese (you should have one 4 oz. serving)

2. Avoid high phosphorus foods such as:

- Lima Beans, Black Beans, Red Beans, Black-eyed Peas, White Beans and Garbanzo Beans
- Dark, whole or unrefined grains
- Dried vegetables and fruits
- Chocolate
- Dark colored sodas

3. Don’t forget to take your phosphate binders with meals and snacks.

- It should be taken along with your food and snack.

4. Usually your diet is limited to 1000 - 1400mg of phosphorus per day.

CALCIUM

Calcium is a mineral that is important for building strong bones. However, foods that are good sources of calcium are also high in phosphorus.

Too much phosphorus in the blood pulls calcium from bones and causes renal bone disease. The best ways to prevent loss of calcium from your bones are to follow diet that limits high-phosphorus foods and to take phosphate binders.

POTASSIUM

Potassium is an element that is necessary for the body to keep a normal water balance between the cells and body fluids. All foods contain some potassium, but some contain larger amounts. Normal kidney function will remove potassium through urination. Kidneys that are not functioning properly cannot remove the potassium in the urine, so it builds up in the blood. This can be very dangerous to your heart. High potassium can cause irregular heartbeats and can even cause the heart to stop if the potassium levels get too high.

Tips to reduce or limit the potassium intake.

- Usually a renal patient’s diet should be limited to 2000 mg – 2500mg (2-2.5g) of potassium each day.

The following foods are high in potassium:

Bananas , Avocado, Oranges , Prunes, Tomatoes, Tomato Sauce, Nuts, Papaya, Chocolate, Red Beans Milk, White Beans, Lima Beans ,Garbanzo Beans , Black Beans, Lentils, Split peas, Baked Beans – avoid these foods.

Leaching

The potassium content in the vegetables can be reduced by method called leaching

Specially Prepared Potatoes:

1. Peel and slice into 1/8 inch pieces.

2. Soak 1 cup potatoes in 5 cups of water for 2 hours.

3. Drain and rinse and drain.

4. Cook in a large amount of water.

5. Drain and mash, fry or serve plain.

SODIUM

Sodium or sodium chloride is an element that is used by all living creatures to regulate the water content in the body. Usually a sodium restriction comes in the form of "No Added Salt." This is necessary because a greater intake of sodium will result in poorly controlled blood pressure and excessive thirst which can lead to difficulty adhering to the fluid restrictions in your diet.

To limit your sodium, you should:

- Avoid table salt and any seasonings that end with the word "salt"
- Avoid salt substitutes (they contain potassium)
- Avoid salty meats such as bacon, ham, sausage, hot dogs, lunch meats, canned meats, or bologna
- Avoid salty snacks such as cheese curls, salted crackers, nuts, and chips
- Avoid canned soups, frozen dinners, and instant noodles Avoid bottled sauces, pickles, olives,
- Use spices and herbs e.g.: coriander, mint, black pepper, curry powder, cumin, cayenne pepper, chilli powder, ground ginger and coriander
- Use lemon juice and vinegar to flavor the food
- Check the pack labels or contents in the pack items to determine the amount of salt

FLUIDS

Fluid is any food or beverage that is liquid at room temperature. Some examples are:

- ice
- beverages like coffee, tea, sodas, juices and water
- frozen desserts such as ice cream, sherbet or popsicles
- gelatin
- gravy , soups, rasam

People on dialysis often have decreased urine output, so increased fluid in the body can put unnecessary pressure on the person's heart and lungs. The extra fluid can cause:

- Swelling or puffiness around eyes, hands or feet
- Fluid weight gain and shortness of breath
- A rise in blood pressure
- More work for your heart

Person in hemodialysis can take approximately 4 cups of fluids i.e. 800ml plus daily urine output.

Hints for fluid control

- Use jugs and measuring cups to accurately measure your fluid intake
- Drink from small rather than large cups
- Take sips of water
- Stay out of the heat. If you need to go outside, choose the cooler part of the day.
- Choose foods low in salt

- Brush your teeth to freshen your mouth.
- Keep lips from getting dry by using lip balm
- Suck on lollies or a slice of lemon instead of drinking.

CONCLUSION

A chronic illness like kidney failure can require changes in your eating and drinking habits. These lifestyle changes can be hard to understand- and even harder to make but it will help you feel better, and help you avoid complications.

APPENDIX -- D2

INTERVENTION IN TAMIL

ஊட்டச்சத்துகள் மற்றும் ஹீமோடையாலிசிஸ்

பற்றிய நலக்கல்வி

முன்னுரை:

ஆரோக்கியமான சிறுநீரகம் உங்களது இரத்தத்தை சுத்தம் செய்து, உடலிலுள்ள தேவைக்கு அதிகமாக நீரை சிறுநீர் வடிவத்தில் வெளியேற்றுகிறது. அதுமட்டுல்லாமல் உங்களது உடலை ஆரோக்கியமாக வைப்பதற்கான பொருட்களையும் உண்டாக்குகிறது. நாள்பட்ட சிறுநீரக நோய் மற்றும் சிறுநீரக செயலிழப்பானது உங்கள் சிறுநீரகத்தின் செயல்பாடான கழிவு மற்றும் தேவைக்கு அதிகமான நீரை வடிகட்டி வெளியேற்றும் நிலையில் சிறுநீரகத்தின் ஒரு சில செயல்பாடுகளை அதற்கு பதிலாக டயாலிசிஸ் செய்கிறது. டயாலிசிஸ் என்பது ஒரு செயல் முறையாகும். அது மனிதரால் உண்டாக்கப்பட்ட டயலைஸர் என்ற சவ்வை பயன்படுத்தி.

1. இரத்தக்திலுள்ள கழிவுப்பொருட்கள் அதாவது யூரியா போன்றவற்றை வெளியேற்றுகிறது.
2. இரத்தக்திலுள்ள மின் அயனிகளின் சமநிலையை மீண்டும் சரியான நிலையில் வைக்கிறது.
3. தேவைக்கு அதிகமான நீரை உடலிருந்து வெளியேற்றுகிறது.

ஊட்டச்சத்து:

- ஊட்டச்சத்து என்பது உயிரினங்கள் மற்றும் செல்கள் உயிர்வாழ்வதற்கு தேவையான சத்துப்பொருட்களை அளிக்கிறது.
- உணவிலுள்ள ஊட்டச்சத்தை அளிக்கக்கூடிய தனிமங்கள் மற்றும் வேதிப்பொருட்களே ஊட்டச்சத்துகள் ஆகும்.

இந்த ஊட்டச்சத்துக்களை நாம் பேரளவு ஊட்டச்சத்துகள் அதிக அளவிற்கு தேவைப்படுபவை அல்லது நுண்ணளவு ஊட்டச்சத்துக்கள் குறைந்த அளவிற்கு தேவைப்படுபவை என இரு வகைப்படுத்தலாம்.

- பேரளவு ஊட்டச்சத்துகள் என்பவை கார்போ ஹைட்ரேட், கொழுப்புச்சத்து, புரதச்சத்து மற்றும் நீர் போன்றவைகள் ஆகும். நுண்ணளவு ஊட்டச்சத்துகள் என்பவை தாதுப்பொருட்கள் மற்றும் வைட்டமின்கள் ஆகும்.
- பேரளவு ஊட்டச்சத்துகள் மட்டுமே நமது உடலுக்கு சக்தி அளிக்கிறது.

நீங்கள் ஹீமோடையாலிசிஸ் சிகிச்சை பெறுகிறீர்கள் என்றால், உங்கள் உணவு உங்களுடைய ஒட்டுமொத்த பாதுகாப்பிற்கான ஒரு முக்கியபகுதியாக உள்ளது.

ஹீமோடயாலிசிஸ் உணவு உட்கொள்ளுதலையும் ஊட்டச்சத்து தேவையையும் பாதிப்பதால் ஊட்டச்சத்து குறைபாடு ஏற்படுகிறது.

ஹீமோடையலிசிஸ்கான உணவு பல முக்கிய செயல்பாடுகளை கொண்டுள்ளது.

அவையாவன:

- கழிவுப்பொருட்கள் தேங்குவதை கட்டுப்பாட்டிற்குள் வைக்கிறது. யூரியா பாஸ்பேட், பொட்டாசியம், திரவம் மற்றும் உப்பு.
- வளர்சிதை மாற்ற சிக்கல்களை தவிர்க்கிறது. எ.கா சிறுநீராக எலும்பு நோய் மற்றும் பசியின்மை.
- டயாலிசிஸ் செல்முறையினால் உண்டான ஊட்டச்சத்து இழப்பை சரிசெய்து பழய நிலைக்கு கொண்டு வருகிறது. நைட்ரஜன், வைட்டமின்கள் மற்றும் தாதுப்பொருட்கள்.
- உடலின் ஊட்டச்சத்து நிலையை பராமரிக்கிறது.

இந்த வழிமுறைகள் ஊட்டச்சத்து தேவைக்கான ஆற்றல்

புரதம், பாஸ்பரஸ், பொட்டாசியம், திரவம், சோடியம், வைட்டமின் மற்றும் தாதுபொருட்கள் அடங்கிய பரிந்துரைகளை கொண்டுள்ளது.

உணவில் உள்ள ஆற்றலை குறிக்கும் அளவே கலோரி ஆகும்.

மோட்டார் ஓடுவதற்கான ஆற்றலை எரிபொருள் கொடுப்பது போல நமது உடலுக்கான ஆற்றலை நாம் உண்ணும் உணவு கொடுக்கிறது.

(ஒரு நாளைக்கு தேவைப்படும் கலோரியின் அளவு)

- 30-35 கி.கலோரி / உடல் எடை / (கிலோகிராம் / நாள்)
- 60 வயதிற்கும் கீழ் உள்ளவர்களுக்கு உடல் எடை
  கிலோ.கி. ------- * 35 = ------- கலோரி
- 60 வயது அல்லது அதற்கு மேற்பட்டவர்களுக்கு; உடல் எடை / (கிலோகிராம் / நாள). --------* 30= ------கலோரி
- டயாலிசிஸ் செய்து கொளப்வர்கள் கார்போஹைட்ரேட் மற்றும் கொழுப்புச்சத்து அளவை விட அதிக புரதச்சத்தை எடுத்துக்கொள்ள வேண்டும்.

உங்களது பசியுணர்வை அதிகரிப்பதற்கும், உடலுக்கு தேவையான கலோரியை பெறுவதற்குமான குறிப்புகள் :

- ஒரு நாளைக்கு மூன்று முறை அதிக அளவு உணவு உட்கொள்வதை விட அதே அளவு உணவை ஆறுமுறை பிரித்து உட்கொள்ளலாம்.
- அதிக அளவு கலோரி மற்றும் புரதசத்து நிறைந்த இறைச்சி, மீன் மற்றும் சோயாபீன்ஸ் போன்ற உணவை உட்கொள்ளலாம்.
- கலோரியின் அளவை அதிகரிக்கும் வண்ணமாக உணவை சமைத்தல் (ஆலிவ் எண்ணெய் மற்றும் சூரியகாந்தி எண்ணெய் போன்ற கரையாத கொழுப்புச்சத்து அடங்கிய எண்ணெயை உபயோகித்தல்.)
- அமைதியான சுற்றுசூழலில் உணவு உண்ணுதல்.
- கலோரி அடங்கியுள்ள பானங்களை அருந்துதல்.
- மென்று உண்பதற்கு எளிமையான உணவுகளை தேர்வு செய்து உண்ணுதல்.
- பசியின்மையை அதிகரிப்பதற்கு உடற்பயிற்சிகளை செய்யலாம்.

கார்போஹைட்ரேட்:

கார்போஹைட்ரேட் என்பது ஒரு வகையான மாவுச்சத்து நிறைந்துள்ள பொருளாகும். அது உங்களது உடலில் கர்த்கரையாக மாறி உடலுக்குத்தேவையான ஆற்றலை அளிக்கக்கூடிய முதன்மையான ஆதாரமாகும்.

ஹீமோடையலைசிஸ் சிகிச்சை பெறும் நபர், உடலுக்கு தேவையான ஆற்றலை சந்திக்க கார்போஹைட்ரேட்டை விட அதிக அளவு புதரச்சத்துள்ள உணவுப்பொருட்களை உட்கொள்ள வேண்டும்.

நீரிழிவு நோய் மற்றும் கார்போஹைட்ரேட்:

ஓட்ஸ், கோதுமை மற்றும் பார்லி போன்ற அதிகளவு நார்ச்சத்து அடங்கியுள்ள உணவுப்பொருட்கள் இரத்தத்தில் குறைந்த அளவே சர்க்கரையின் அளவை உயர்த்துகிறது.

பிஸ்தா, சோளம், அரிசி, வெள்ளை ரொர்டி போன்ற உணவுப்பொருட்கள் இரத்தத்தில் உள்ள சர்க்கரையின் அளவை அதிகரிக்கிறது.

கொழுப்புச்சத்து

கொழுப்புச்சத்தானது நமது உடலுக்குத் தேவையான ஆற்றலை உற்பத்தி செய்வதற்கும், உடல் உறுப்புகள் சேதமடையாமல் பாதுகாப்பதற்கும், உடலின் நிலையான வெப்பநிலை பராமரிப்பதற்கும் மற்றும் ஒரு சில வைட்டமின்களை கரைப்பதற்கும் தேவைப்படுகிறது.

ஹீமோடையாலிசிஸ் சிகிச்சை பெறும் நபருக்கு இதய நோய் ஏற்படுவதற்கான வாய்ப்புகள் உள்ளது.

இதனால் இதயத்திற்கு ஆரோக்கியமான கொழுப்பை தேர்ந்தெடுப்பது மிக முக்கியம்.

இதயத்திற்கு ஆரோக்கியமான கொழுப்புகள்:

அறை வெப்பநிமைலயில், திரவாக உள்ள கொழுப்பானது (கரையாத கொழுப்பு) குறைந்த அளவே இதயத்திலுள்ள தமனிகளை பாதிக்கிறது.

கரையாத கொழுப்புகளாவன:

1. ஆலிவ் எண்ணெய்
2. வாதுமை கொட்டை வகை எண்ணெய்
3. சூரியகாந்தி எண்ணெய்
4. சோள எண்ணெய்
5. பருத்திவிதை எண்ணெய்
6. சோயாபீன்ஸ் எண்ணெய்

புரதச்சத்து :

சரிவிகித புதரதச்சத்தை பெற்றுக்கொள்வது உங்களது உடலின் ஒட்டுமொத்த சுகாதாரத்திற்கும் முக்கியமானதாகும்.

சரிவிகித புரதச்சத்து தேவைப்படுவதற்கான காரணங்கள்:

- தசைகளை கட்டுவதற்கு
- உடலின் திசுக்களை சரிசெய்வதற்கு
- நோய்களை எதிர்த்து போராடுவதற்கு

ஹீமோடையாலிசிஸ் சிகிச்சை பெறும் நபர் எடுத்துக்கொள்ள வேண்டிய புரதச்சத்தின் அளவு : 1-1.2 கிராம் / கி.கி / உடல் எடை / நாள்

ஆதிக தரம் அல்லது உயர் உயிரியல் மதிப்புள்ள புரத ஆதாரங்கள்:

- மாட்டிறைச்சி, பன்றி இறைச்சி மற்றும் ஆட்டிறைச்சி
- சிக்கன் மற்றும் பறவை வகை சார்ந்த இறைச்சி
- மீன் மற்றும் கடல் உணவுப்பொருட்கள்
- முட்டை
- சோயாபீன்ஸ்

இவை மனித உடலில் உற்பத்தி செய்ய முடியாத வகை மற்றும் அத்தியாவசியமான அமினோ அமிலங்கள் உள்ள உணவு வகைகளாகும்.

தரம் குறைந்த அல்லது குறைந்த உயிரியல் மதிப்புள்ள புரத ஆதாரங்கள்:

- கொட்டைகள்
- உலர்ந்த பீன்ஸ் மற்றும் அமரந்த் பக் கோதுமை, சோள உணவு, பழுப்பரிசி

ஹீமோடயாலிசிஸ் நோயாளிகள் குறைந்த தரம் உள்ள புரதசத்தை குறைவான அளவில்தான் உட்கொள்ள வேண்டும். ஏனெனில் இவை பொட்டாசியம் அதிகம் உள்ளவை ஆதலால் உடலுக்கு தீமை விளைவிக்கும்.

பாஸ்பரஸ் :

பாஸ்பரஸ் ஒரு தாதுப்பொருள், அது ஆரோக்கியமான சிறுநீரகத்தினால் சிறுநீரில் வெளியேற்றப்படுகிறது. சிறுநீரகம் செயலிழந்துவிட்டால் பாஸ்பரஸின் அளவு இரத்தத்தில் அதிகஅளவு கலந்துவிடுகின்றன. அதனால் அதிகமான விளைவுகள் ஏற்படுகிறது. இதில் தசைவலி மற்றும் வலி, எலும்புகள் சுலபமாக முறிவடையும் வாய்ப்பு அதிகம் உள்ளன. ஆதலால் உடலுக்கு தீமை விளைவிக்கும்.

பாஸ்பரஸின் அளவு இரத்தத்தில் அதிகமாவதால் தோல் அரிப்பு ஏற்படுகிறது.

பாஸ்பரஸின் அளவை சரியாக வைத்துக்கொள்ள சில வழிமுறைகள்:

1. பால் மற்றும் பால் உணவு பொருட்கள் வெண்ணெய் போன்றவை – ஒரு முறைக்கு 4 அவுன்ஸ் மட்டுமே எடுத்துக்கொள்ள வேண்டும்.

2. தவிர்க்க வேண்டிய அதிக பாஸ்பரஸ் அடங்கியுள்ள உணவுப்பொருட்கள்:

- மொச்சை, கருப்பு, பீன்ஸ், சிவப்பு பீன்ஸ், கருப்பு பட்டாணி, வெள்ளைப்பட்டாணி.
- முழுமையான மற்றும் சுத்திகரிக்கப்படாத தானியங்கள்.
- உலர்ந்த காய்கறிகள் மற்றும் பழங்கள்.
- சாக்லேட்
- இருண்ட நிற சோடாக்கள் மற்றம் பானங்கள்.

3. பாஸ்பரஸ் பைண்டர் மாத்திரைகளை எடுக்க மறக்க வேண்டாம்.

நீங்கள் உணவு உட்கொள்ளும் போது மற்றும் சிற்றுண்டி உட்கொள்ளும் போதும் எடுத்துக்கொள்ள வேண்டும்.

4. எப்போதும் உங்கள் உணவில் பாஸ்பரஸின் குறைந்த அளவு 1000 மற்றும் 1400 மி.கி பாஸ்பரஸ் மட்டுமே இருக்க வேண்டும்.

கால்சியம் :

கால்சியம் ஒரு தாதுப்பொருள் எலும்புகளை வலுவாக வைத்துக்கொள்ள இது முக்கியமானது. கால்சியம் அதிகமாக உள்ள உணவுகளில் பாஸ்பரஸ்-ம் அதிகமாகவே உள்ளது.

இரத்தத்தில் அதிகமாக பாஸ்பரஸ் இருந்தால் எலும்புகளில் உள்ள கால்சியத்தை எடுத்துக்கொண்டு சிறுநீரக எலும்பு நோயை உண்டாக்குகிறது. இந்த சிறுநீரக எலும்புநோயை தவிர்க்க வேண்டுமானால் அதிக பாஸ்பரஸ் உள்ள உணவுப்பொருட்களை குறைந்த அளவும், மேலும் பாஸ்பேட்பைண்டர்ஸ் மாத்திரைகளையும் எடுத்துக்கொள்ள வேண்டும்.

பொட்டாசியம் :

பொட்டாசியம் என்பது ஒரு தாதுப்பொருள். நமது உடலில் உள்ள திசுக்களுக்கும், உடல் திரவத்திற்கும் இடையேயான சரியான விகிதத்தை பராமரிக்க உதவுகிறது. எல்லா உணவுப்பொருட்களிலும் பொட்டாசியம் அடங்கியுள்ளது. ஆரோக்கியமான சிறுநீரகங்கள் நமது உடலில் உள்ள பொட்டாசியத்தை சிறுநீரின் மூலம் வெளியேற்றுகின்றது. சிறுநீரகம் சரியாக செயல்படவில்லை என்றால் பொட்டாசியத்தை சரியாக சிறுநீரின்மூலம் வெளியேற்ற முடியாது. ஆதனால் பொட்டாசியம் நமது இரத்தத்தில் தங்கிவிடுகிறது. இதனால் நம் இதயத்திற்கு அதிக அளவு பாதிப்பு ஏற்படுகிறது. அதிக பொட்டாசியத்தின் விளைவாக ஒழுங்கற்ற இதயத்துடிப்பு மற்றும் இதயம் துடிப்பது நின்று விடவும் கூடும்.

பொட்டாசியம் கலந்த உணவு பொருட்களை உண்பதை குறைப்பதற்கான வழிமுறைகள்:

- சராசரியாக சிறுநீரக நோயாளிகள் 2000மி.கி-2500மி.கி (2-2.5கி) பொட்டாசியம் ஒரு நாளைக்கு உட்கொள்ள வேண்டும்.

அதிக பொட்டாசியம் உள்ள உணவுகள்:

வாழைப்பழம், ஆரஞ்சு, சிவப்பு தக்காளி மற்றும் சாறு, பப்பாளி, பாதாம், சாக்லேட், சிவப்பு பட்டாணி, வெள்ளை பட்டாணி, பால், பிஸ்தா பருப்பு, கீரை வகைகள் இவை அனைத்தும் தவிர்க்க வேண்டும்.

ஊறவைத்து சமைத்தல்:

காய்கறிகளில் உள்ள பொட்டாசியம் அளவை குறைக்க பயன்படுத்தும் முறை ஊறவைத்து சமைத்தல் எனப்படும்.

சிறப்பான முறையில் உருளைக்கிழங்கை சமைத்தல்:

- தோல் சீவி 1/8 இஞ்சு அளவிற்கு சிறிய துண்டுகளாக வெட்டவும்.
- வெட்டிய 1 கப் துண்டுகளை 5 கப் நீரில் இரண்டு மணி நேரத்திற்கு ஊற வைக்கவும்.
- வடித்துவிட்டு மீண்டும் அலசி வடித்து விடவும்.
- சமைப்பதற்கு அதிக நீரை பயன்படுத்த வேண்டும்.
- வேகவைத்து, நீரை வடித்து பிசைந்து, வறுத்து அல்லது அப்படியே பரிமாறலாம்

சோடியம் :

சோடியம் அல்லது சோடியம் குளோரைடு பொருள்கள் அனைத்து உயிரினங்களுக்கும் தேவைப்படும் ஒன்று. இது நமது உடலின் தண்ணீரின் அளவை சரி செய்கிறது. உப்பின் அளவை குறைப்பது என்பது சாதாரணமாக உணவில் சேர்க்கப்படும் உப்பை கட்டுப்படுத்துவதே ஆகும். சோடியத்தை அதிகம் உடகொள்ளும் போது இரத்த அழுத்தமும், அதிக அளவு தாகமும் ஏற்படுகிறது. இதனால் உங்கள் உணவில் தண்ணீரின் அளவை குறைப்பது சிரமமாகிவிடும்.

நீங்கள் சோடியத்தின் அளவை குறைப்பதற்கு:

- உப்பு மற்றும் சோடியத்தின் அளவை முற்றிலும் தவிர்க்க வேண்டும்.
- உப்பு சார்ந்த உணவுப்பொருட்களை தவர்க்க வேண்டும். இவை பொட்டாசியத்தையும் கொண்டுள்ளது.
- உப்பு நிறைந்த உணவுப்பொருள்கள், அதாவது பன்றியின் வேக வைக்கப்பட்ட தொடை இறைச்சி, பதப்படுத்தப்பட்ட இறைச்சி தவிர்க்க வேண்டும.
- உப்பு நிறைந்த திண்பண்டங்கள் அதாவது பாலாடைக்கட்டி, உப்பு நிறைந்த முறுக்கு, தானியங்கள் மற்றும் சிப்ஸ்களை தவிர்க்க வேண்டும்.
- பதப்படுத்தப்பட்ட சூப், சிற்றுண்டி வகைகள், நூடுல்ஸ், சாறுகள் மற்றும் ஊறுகாய் தவிர்க்க வேண்டும.
- வாசளன மற்றும் மூலிகைப்பொருள்கள் பயன்படுத்தலாம எ.கா. கொத்தமல்லி, புதினா, கருப்பு மிளகு, குழம்பு பொடி, சீரகம், மிளகாய்தூள், இஞ்சி, மிளகு.
- உணவை ருசியாக்க எலுமிச்சை சாறு மற்றும் காடியை பயன்படுத்தலாம்.

- அடைக்கப்பட்டுள்ள உணவுப்பொருளை சரிபார்த்து எவ்வளவு உப்பு உள்ளது என்பதை பார்க்க வேண்டும்.

திரவ உணவு:

திரவ உணவு பாணங்கள் என்பவை அறை வெப்பநிலையில் திரவ நிலையில் இருப்பவை ஆகும்.

சில எடுத்துக்காட்டுகள்:

- பனிக்கட்டி
- நீர் ஆகாரங்கள் காபி, டீ, சோடா, சாறு மற்றும் தண்ணீர்.
- உறைந்து போன ஐஸ்கிரீம், இனிப்பான குடிநீர் பானம்
- குழம்பு, சூப்பு, ரசம்.

டயாலிசிஸ் செய்து கொள்ளும் நபர்களுக்கு சிறுநீர் வெளியேறும் அளவு குறைந்துவிடும். ஆதனால் உடம்பில் திரவத்தின் அளவு அதிகமாக இருப்பதால் இதயம் மற்றும் நுரையீரலில் அழுத்தம் அதிகரிக்கும்.

அதிகமான அளவு திரவம் இருப்பதால் அதன்மூலமாக ஏற்படும் விளைவுகள்?

- கண்களிலும் கைகளிலும் பாதங்களிலும் வீக்கம் காணப்படும்.
- உடலில் நீர்சத்து அதிகரிப்பதால் மூச்சுத்திணறல் ஏற்படும்.
- இரத்த அழுத்த அளவு அதிகரிக்கும்.
- இதயத்தின் வேலை அதிகமாகும்.

ஹீமோடையாலிசிஸ் செய்து கொள்ளும் நபர் சராசரியாக 4 கப் திரவம் எடுத்துக்கொள்ள வேண்டும். அதாவது ஒரு நாளைக்கு வெளியேறும் சிறுநீரின் அளவுடன் 800 மி.லி. எடுத்துக்கொள்ள வேண்டும்.

திரவத்தை கட்டுப்பாட்டில் வைத்துக்கொள்ள சில குறிப்புகள்:

- நீங்கள் பருகும் நீரை அளவிட ஜாடி அல்லது அளவு கப்புகளை பயன்படுத்த வேண்டும்.
- நீங்கள் நீரை பருகுவதற்கு பெரிய கப்புகளுக்கு பதிலாக சிறிய கப்புகளை பயன்படுத்தலாம்.
- நீர் பருகும் போது சிறிது அளவே உட்கொள்ள வேண்டும்.
- உப்புச்சத்து குறைவாக உள்ள உணவுப்பொருட்களை உண்ண வேண்டும்.
- நீங்கள் புத்துணர்ச்சியுடன் இருப்பதற்கு பற்களை நன்றாக துலக்க வேண்டும்.

- உதடுகள் வறண்டு போவதை தவிர்க்க வேண்டும். எண்ணெய் திரவங்களை பயன்படுத்தலாம்.
- தாகத்தை போக்குவதற்கு மிட்டாய் அல்லது எலுமிச்சை துண்டுகளை வாயில் வைத்துக் கொள்ளலாம்.

முடிவுரை:

நாள்பட்ட சிறுநீரக செயலிழப்பு உணவு பழக்கங்களை மாற்றுகிறது. நமது வாழ்க்கை முறை மற்றும் பழக்க வழக்கங்களை மாற்றுவதன் மூலம் பின் விளைவுகளை தவிர்க்கலாம்.

அதிக வெப்ப சூழலில் இருப்பதை தவிர்க்கவும். வெளியே செல்ல வேண்டுமானால் குளிர்ந்த நேரத்தில் செல்லலாம்.

நாள்பட்ட சிறுநீரக செயலிழப்பு நோய்களுக்கு திட மற்றும் திரவ உணவு வகைகளை உட்கொள்ளும் பழக்கத்தில் மாற்றங்களை புரிந்துகொண்டு செயல்முறைப்படுத்துவது சிறிது சிரமமாக இருந்தாலும் உங்கள் வாழ்க்கையும், உடல் நிலையும் சிறந்த முறையில் இருப்பதற்கும், பின் விளைவுகள் ஏற்படாமல் இருப்பதற்கும் உதவுகிறது.

APPENDIX – E

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APPENDIX -- F

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